DRAGON USER

The independent Dragon magazine

February 1987

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Editorial

HERE at Dragon Towers it is the 5th of January, and the new year has well and truly begun. The last nut has been cracked, the last cracker has been pulled. All we need to do now is sweep the office. Perhaps we'll find some of that copy which was supposed to reach us a week ago... Apart from the shortage of working days and a certain vagueness about what week, month, or year we are in, Dragon User's editorial team seem to have survived the festive season pretty well. Ask me about our contributors later ... but Quickbeam have said that they are planning between three and six new games this year, which is good news from the suppliers' corner.

Thank you to the readers who sent 6809 show reports in, and a selection of those will appear next month. We may try doing a reader copy request again at points in the future. While we are on the subject of contributors, don't forget that anyone who wants to send in a review of any reasonably current program, on spec, is welcome to do so. Most of the time we won't be able to use them, but some of the time we will, and there's about a tenner in it for any review we publish. Please follow the format used in Dragon Soft, give all the relevant information about price, supplier etc., a balanced description of the program and (the vital ingredient) your opinion.

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How to submit articles

The quality of the material we can publish in *Dragon User* each month will, to a very great extent depend on the quality of the discoveries that you can make with your Dragon. The Dragon computer was launched on to the market with a powerful version of Basic, but with very poor documentation.

Articles which are submitted to *Dragon User* for publication should not be more than 3000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped addressed envelope.

Letters

Lost address

PLEASE would you print a message on your letters page for me. The message is:

"Would the person who sent me a tape some time ago please contact me as I have lost your address and am unable to return it. Please remember to try and identify some of the contents of this tape to avoid any chance of someone trying to mislead us. Many thanks. Mick Johnson."

I hope this will be possible as I feel a little guilty at not being able to return this person's property.

Also I am very interested in any new software for my Tandy 64k CoCo so any reader who has anything please let me know.

M. Johnson
26 College St.
Boulton Estate
Birmingham
B18 7PD

Germans call

FIRST of all we'd like to say keep up the good work, as it's much appreciated. Secondly your review of *Beanstalker* in DU May 1986 was a little on the brief side but never the less out we went and purchased it and want to take this opportunity to compliment Roy Coates on a superbly produced game and a masterpiece of machine code programming.

The game is a real joy to play but only comes in to its own upon entering the requested access code to reveal what can only be described as a complete screen editor capable of redesigning or even creating your own personal screens. Who needs lives pokes! The access is only achieved by hacking into the game finding the codeword which is very cleverly hidden (it begins and ends with the letter "R") and that is only the first half of the protection they can contact us by letter for further help.

Finally due to lack of information of the Dragon Plus expansion board we would be grateful hearing from any other owners of the 128k beast, to exchange ideas, programs, etc. and anybody running Flex/OS9 or even people who just own a Dragon if at all interested why not drop us a line?

The British Dragon Owners
Club of Germany
c/o Malcolm Stainton
Ulzberger Str. 491
2000 Norderstedt
West Germany

Anti-amnesiac

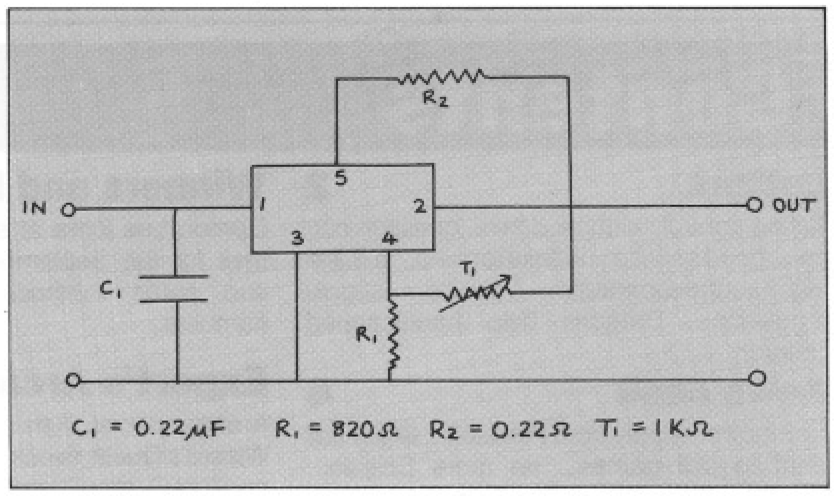
I HAVE since I first bought a Dragon suffered from inexplicable memory corruption and read/write and seek errors using my DeltaDOS cartridge. Recently I took a close look at the power supply and found that the voltage regulator LM309K is only rated at 1 amp. On checking voltages I found the +5V supply down to 4.75V. I assumed this was the cause of the problem.

I replaced the regulator with the following circuit using the L200 regulator from Maplin Electronic Supplies. This allows the voltage to be adjustable accurately to 5V and limits the current to 2A.

Since I made this modification I have not suffered any disc or memory errors and I have been able to do away with the interference filter I have been using on my mains supply.

I hope you have readers who are interested in this information.

Ian N. Chipperfield
9 Sun Valley Close
Brixham
Devon TQ5 8JG



Call and response

FIRSTLY, thank you for publishing my request for help in September '86. The response was better than we had hoped for, with letters from as far away as Sweden! I have had problems finding the time to reply and keep up communication with the many Dragon users offering help.

Could you please pass on an apology to those who have not yet had a reply, and a heartfelt thank-you from myself and the children to all the caring people who have responded with software, listings and ideas to help the children enjoy our Dragon.

Help is still needed, particularly for children who have severe handicaps and can't use the keyboard or joystick, or read simple instructions.

Try to imagine using a computer programmed in Chinese while wearing boxing gloves!

We have several children with this degree of disability who would benefit from being able to achieve active control over something in their lives without the direct assistance of others.

A group of students from Plymouth Polytechnic Electrical Engineering department have written to me with the intention of setting up a project, and I have suggested that the Dragon's ability to detect soft and loud noises of varying pitch and tone via the PIA could be used as a means of communicating with the computer hands off, so to speak. Voice recognition is far beyond the reach of any micro at the moment, but if a key fob can be made to whistle back at you then I'm sure the Dragon can do better, with a little help from its friends!

I have managed to write a 'disco' program which responds to music from the cassette player, but need some sort of pre-amp unit to achieve direct control from a microphone, preferably with tone and volume controls for trimming. One or two guitar effects have been tried with no success; the only thing which seems to work is a twin-tape stereo recorder with dubbing facilities (hardly a small cheap interface!).

If any reader could come up with a small unit, perhaps battery operated, or some interesting programs which will work from this type of input it would be a great help.

Here is a short listing which gives the changing values when sound is inputted through the cassette port. Using IF...THEN statements, all sorts of things could be possible (even more in M/C?). Perhaps if it could be determined which sounds trigger which combination of memory locations, then the 'whistling key fob' idea might be expanded upon and put to good use?

Listing for Sound Peeks

```
10 CLS): MOTOR ON: AUDIO
ON
20 C=10
30 FOR P = 65312 TO 65340
STEP 4
40 PRINT@C,;P; PEEK (P);
50 C=C+64
60 NEXT
70 GOTO 20
```

I feel that this is a largely unexplored Dragon capability and, with a little experimentation, could open up a whole range of possibilities, given suitable programming and an interface which responds to sounds.

Once again, a big thank you to Dragon User and its readers for their help.

Stuart Beardwood
Westgarth Children's Home
79 Victoria Road
Elland
W. Yorks.

P.S. I am not the proud owner of a Dragon 64 which may be used at Westgarth if we get any problems which require the extra memory/facilities.

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Taking control

SOME reflections about the program Taking Control in DU May 1986. Changes which you can do with the help of the ALTER program:

COPY: A right movement can only be done from lower to higher place in memory. No movements from $8000 to lower. (Op-code BGE, 2C at 3700, ought to be BHI.) But if you try copying from $8000 to lower address then Source-End will be Destination-Start? I suggest the following:

ALTER $OE70 fr 10 to 20
$OE71 fr BC to OD

FILL: The program does not fill the inputted End address.

ALTER $OEE2 fr 25 to 23

EXAMINE: If you want to get the same directions as in Alter when using the up and down arrows, then:

ALTER $OR7E fr 5F to 5B
$OF82 fr 5B to 5F
$OF86 fr OA to 5E
$OF8A fr 5E to OA

INPUT BREAKE: If you want to use BREAKE when inputting:

ALTER $1127 fr 62 to BD
$1128 fr 9F to 80
$1129 fr OO to O6
$113A fr 88 to 27
$113B fr BD to FB
$113C fr 80 to 81
$113D fr 06 to 03
$113E fr 27 to 27
$113F fr F7 to BC

The only thing you lose is the flashing cursor.

Martin Norrman
Edsbergsvagen 12
19151 Sollentuna
Sweden

Empty promises

I JOINED a computer club advertised in Dragon User classifieds about six months ago, and paid £5 and sent five games, and all I got back was promises and a letter saying they were changing addresses. Has anyone else had this experience?

Graham Bruce
11 Garrick Grove
Rift House Est.
Hartlepool
Cleveland TS25 4EJ

Cowboy outfits or clubs which never get off the ground are a constant problem to specialists. If you want to join a concern you have never heard of before, use your 'nose' to judge whether they are reliable or not. Any club which asks for a high initial subscription, or asks you to send valuables such as tapes should be treated with caution. Good clubs should circulate lists or allow you to try their wares one newsletter/game/sale at a time.

Question corner

I HAVE been a Dragon 32 owner for some years now but I have not really delved any deeper than playing games. However since discovering your magazine in my local newsagent I have been prompted to write to you in the hope of answering some long standing queries.

1) Can you supply a list of local Dragon enthusiasts?

2) Will any disc drive be Dragon compatible, if so, what make and how?

3) I have lost the documentation to *'Telewriter'*. How can I obtain a copy? Also I am having problems saving the text. Can you assist?

4) What are the pros and cons of cartridge and cassette?

5) Having recently purchased *'Rainbow Writer'* and Salamander's *'Graphics System'* they appear to be very similar. What are their differences and how can I use them in conjunction with *'Composer'*?

6) Have you published reviews of *Telewriter, Rainbow Writer, Composer, Graphics System*?

7) I have a Smith-Corona Fastext 80 printer I should like to find out more detailed information on, as well as applications with the Dragon, eg screen dumps etc.

I realise I have asked a lot of questions but I would be eternally grateful even if you can only answer a few.

Chris Butler
6 Grove View
Stapleton
Bristol
BS16 1DS

FOR information on disc drives, go and have a chat with one of your larger local computer dealers, and/or send an SAE to Peaksoft, 48 Queen St., Balderton, Newark, Notts NG24 3NT, telling them what you want. They do a useful fact sheet.

None of the programs you mention has been reviewed recently, but we have one of Telewriter coming up.

We hope someone can supply answers to some of Chris's more specific questions.

Good service

I FELT I had to write to your magazine to tell you a story of service with a smile.

The following timetable of events is the best testament itself.

Saturday 1st November: purchased *SuperDOS* chip at the Maidstone show.

Sunday 2nd November: discovered *SuperDOS* and *Rainbow Writer* not completely compatible.

Monday 3rd November: phoned Grosvenor Software and explained the problem.

Tuesday 4th November: received my disc and covering letter dates 5th November (the post is diabolical round here) with problem solved and some very polite suggestions on how to improve my own program. I refitted the *SuperDOS* chip and found to my delight my program and *Rainbow Writer* work perfectly.

It is so nice to find a firm still supporting the Dragon and giving the sort of service that most firms gave up years ago that I felt other users should know we still have some very good friends in business who should receive all the support we can give them.

Mr. J. E. Slade
3 Bridges Close
St. Nicholas-at-Wade
Thanet
Kent

Heap of help

A COUPLE of months ago I pleaded in your letters page for help in printing out some of my Dragon 32 programs. As a result I received a mountain of mail for over six weeks. If I were to reply to each offer individually, thanking them for their interest, I would be broke inside a week! I'm now also a student — and you know how poor we are! I wish to take this opportunity, therefore, of thanking all of those who have written and hope that they will accept this as the only acknowledgement I can make. If you have been waiting long for a reply I can only say 'sorry'.

It is true that the Dragon family of users is a particularly close one — of necessity, but I think the reason behind the huge response is more than that. A common interest between people always promotes friendship, however typing away in a darkened room is not the best way to socialise and expand that friendship. Letter writing then breaks down the four walls of your computer room.

I may have stated the obvious here, but what are the results. I think there are three major ones:

i) The idea that computing is driving a generation away from pen and ink is wrong — most of my correspondants were aged less than 16. All round good literacy is essential in programming.

ii) The so called generation gap is rendered non-existant, as young and old have valid contributions to make.

iii) People are willing to give and take advice as we all are, or were, beginners. Thus, however insignificant it may seem, social responsibility is advanced.

What the replies to my request have shown me is that computing encourages attitudes which should be encouraged. As long as such people are in control of computers, I think we can sleep safely at night.

Tim Jenkins
Llys Helyg
Pembrokeshire
SA42 0QZ

News desk

If you have any new products for the Dragon — software or hardware — ring the News Desk on 01-437 4343

Better power supply unit

PEAKSOFT, now one of the few reliable sources of replacement hardware for the Dragon, have further improved the specification of their A1 SupaSmooth replacement power supply.

The new model uses a 'virtually indestructable' Ega polycarbonate box — which means that the components are now 100% British sourced.

As with all A1 Supasmooths, the Dragon unit comes complete with a two year guarantee and lifetime service warranty. Peaksoft themselves say "It's the last power supply you'll ever need ... guaranteed!"

The A1 Supasmooth is available for £18.95 all inclusive from Peaksoft, 48 Queen Street, Balderton, Newark, Notts NG24 3NS.

Because the latest Dragon component to show a propensity for expensive failure is the on/off switch at the back of the computer, Peaksoft also offer the SupaSmooth with an on/off for an extra £2.50. This is covered by the lifetime warranty, and allows the user to avoid using the micro's own switch, relying instead on the guaranteed component.

Peaksoft can be contacted for enquiries on (0636) 705230 (24 hour answering).

Broad sheet

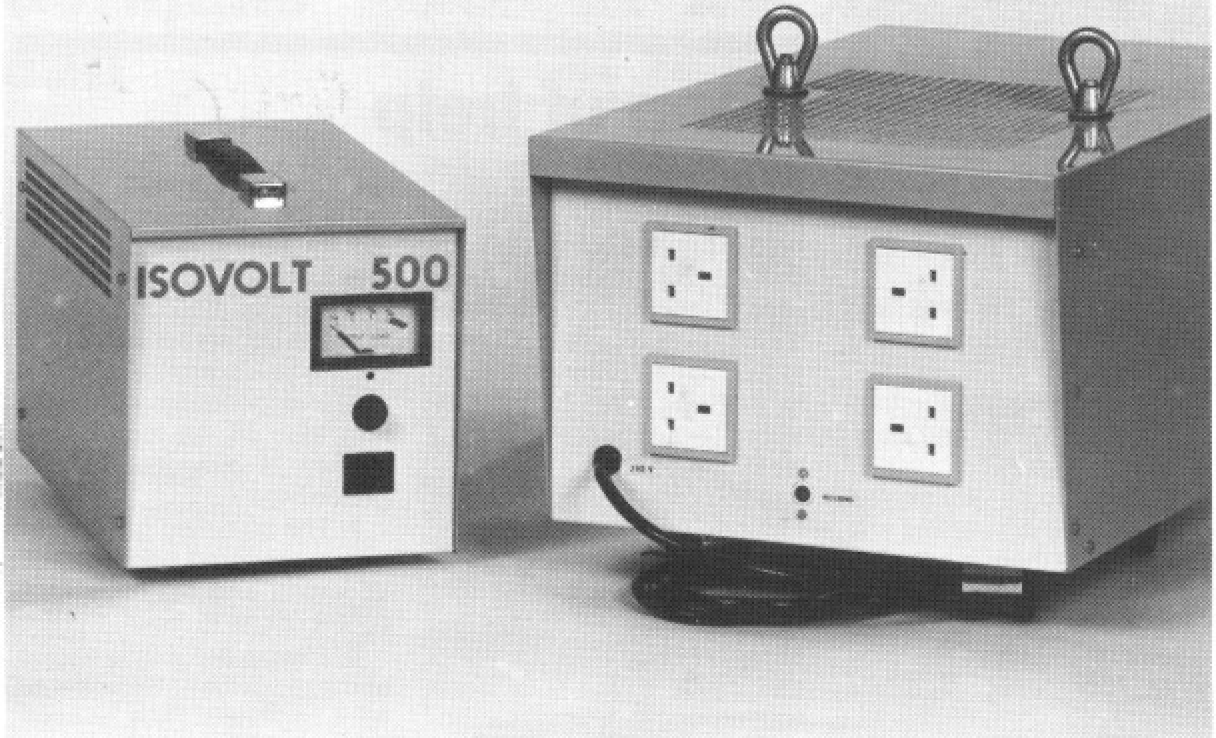
Dragon User has received its first copy (although this is actually issue 2 — wonder where issue 1 went?) of a new newsletter called News from the Dragon. Composed of a good number of sheets stapled together in one corner, the newsletter is edited by R. A. Read, G. Naylor and P. Whittaker.

Most of the newsletter is taken up with reviews of games which have appeared over the last year. They have obviously heard of Dragon User — the editor's page mentions their 'adventure helpline' and then says 'We have also included a cheat's page ... this is basically a round up of those that can be found in Dragon User...'. The column also gives the John Penn show at Cardiff a favourable mention, and says that the projected software library will not now go ahead because postage costs are too high.

Those who have read Peter Whittaker's work in Dragon User will remember that he is an excellent software writer, although his contribution to 'News from the Dragon' is a straightforward opinion column.

Contact: R. A. Read, 37 Edgeworth Drive, Fallowfield, Manchester M14 6RU, with SAE.

Perfect power



FOR THOSE who are getting really heavily into computer workshops may be interested to hear about a new range of ferro-resonant transformers giving guaranteed levels of mains regulation and line conditioning.

The Isovolt units can be used wherever it is essential to have a clean and regulated mains supply. Applications include computers, digital equipment, photographic processing and industrial controls.

Fitted with equipment load meters and overload thermal trips, the units are maintenance free and simple to install and use. Robust cases and a noise level below 40dBs make them suitable for office and industrial purposes. The standard range of power outputs are from 125VA to 10,000VA. An OEM facility caters for special requirements.

Details can be had from Matchpower Systems Ltd., Holmes Court, Boston Road Industrial Estate, Horncastle, Lincs. Tel: (06582) 6390.

Editor's Request

Did anyone out there receive a copy of Boulder Crash as a competition prize at any time since July 1986? And if so, when? Please could you drop me a line and let me know?

No Eclipse

RECENT attempts by readers and Dragon User to contact Mr. Trevor Davies, Eclipse Fenmar's proprietor, have so far proved fruitless. The West Midlands Consumer Service, who were formerly handling enquiries into faulty copies of Total Eclipse closed Fenmar's file earlier this year in the belief that all the enquiries had been dealt with, and Mr. Davies assured us that the game was still on sale and that all exchanges and complaints reaching him would be serviced.

Unfortunately, a few buyers have still to receive a reply from Fenmar, whose office has now closed.

Blaby say...

THAT they would like Dragon User readers to know that, although they are not promoting any new games, they still have copies of all their old games in stock. Anyone trying to get hold of a game can contact Blaby, who will often be able to supply a copy even when it is not on their current list. Contact Blaby Computer Games, Lutterworth Road, Blaby, Leicester, or phone (0533) 773641.

BOSS DOS

The new DragonDOS plus 2.3 is a definite improvement, says ***R.E. Warwick***

WITH the appearance of an 'improved' DRAGONDOS — DRAGONDOS plus 2.3 — the question on everyone's lips is 'Is it a worthwhile improvement?'. This article is intended to aid your assessment in answering that question.

There are a large number of changes incorporated, a few of which affect the 'user interface', including one new error code, ?TR, if an attempt is made to step beyond the track limits, for example attempting to access track 50 on a 40 track disc.

There are no new BASIC commands or functions, but many have been extended (including some not previously used with discs), while error checking has been tightened and a more disciplined approach is required in some areas, especially when changing discs. It also appears that all the DRAGONDOS version 1 errors have been corrected (including any still in version 4 from Eurohard) and no errors introduced.

The first of the many changes comes to light at power up, with the BASIC copyright and DRAGONDOS plus messages appearing without delay and remaining on screen (as in the corrections of May 1985 issue of DRAGON USER). This is followed by disc drive 1 starting, though no head movement occurs unless a disc is in the drive, when the system attempts to 'autoboot'. If the disc is not bootable, a ?BT error occurs. The lack of head movement for ?NR errors is a feature of this DOS, which will also handle hardware ready signals from disc drives, if the cartridge is suitably modified.

If you are still in BASIC, the next revelation is probably keyboard repeat. This is implemented for both DRAGON 32 and 64 (where it is similar to the normal repeat). In addition, n-key rollover is implemented — no more cursing at lost characters! (In many ways, just these two additions make this DOS worthwhile). A single POKE may be used to select between the three options of 'repeat and roll-over', 'roll-over' and 'normal' operation. This ability to turn off repeat and roll-over is essential to avoid interaction with similar facilities built into programs (such as in Disc Dream). It may be argued that by changing the default user interface, this is the wrong way round, but I believe most users will want repeat on rather than off.

The easiest way to show the remaining improvements is to look at each of the BASIC commands and functions that have changed:

AUTO — With the new version of AUTO, 16 bit overflow has been trapped and the line numbers do not wrap if they pass through the 16 bit limit (for example, AUTO 63000,5000 stops after line 63000, whereas in version 1 line 63000 is followed by lines 2464, 7464 etc).

Table 1 — BACKUP timings (seconds)

	40 Tr SS	80 Tr DS
OLD, Verify on	176	704
OLD, Verify off	40	142
NEW	47	192

BACKUP — The first change with BACKUP shows up in the time taken to do a copy, even though the output disc is always verified. If two drives are used this is reduced by over two thirds compared with the VERIFY ON time and increased by less than one third compared with the VERIFY OFF time. Table one gives comparative timings (in seconds) for two drive types. The other change is noticable when using a single drive as the motor stops very quickly when a disc change is needed.

BOOT — The change here is not obvious, in that it affects the program booted. With the new version, the default drive is set to the one specified in the BOOT commands. This, I believe, is a more logical approach.

CHAIN — The improvement that has taken place with CHAIN is in user friendliness and will not be obvious with existing programs. However, the first time the command is used without a call to FRE$ at the start of the chained program, you will find that all the strings are still available. The reason, quite simply, is that the string 'garbage collection' routine is called from within CHAIN just prior to transferring control to the called program, setting the 'bottom of string space allocated' pointer. (This is quite safe, since if there are no strings, the only effect is a slight delay while the variables table is scanned).

CLOSE — Following the lead set in the May 1985 correction, it is now possible to close individual files. Memory location 247 is used to control this, giving three options:

=0 close all files on a drive (the default after power on or
RESET)

Close the last file accessed (as May 85 corrections)

127 close the file using the specified control block (see also OPEN)

In addition, CLOSE is used to clear the disc buffers and, if not a single file close, to set the drive(s) status to unused ready for a possible disc change.

DIR — A number of changes have been implemented here. The most obvious are:

A heading line, with the disc name and whether the disc can be booted.

A slow scroll, making it easier to stop and linger

A file count as well as the number of free bytes on the disc

I understand that originally the output was to be paged (as in version 4) 14 lines at a time, but this required long pauses between pages due to the large eye movements needed to read the information. This was dropped in favour of the slow scroll, which conveys information more quickly as it is possible to continously read the output.

As a result of correcting a fault in the DIR command which corrupted the first control block, another feature has been included that allows a directory listing to be routed to any valid open stream — including to a disc file (though tape and disc files must be OPENed first to assign a stream number). These files are in standard data format and may be processed by program if required.

DSKINIT — The operation of this command has been speeded up markedly (especially noticeable with 80 track, double sided discs) and the ability to name discs added. If the first parameter is a string constant (not a string variable), this is tested for validity (the format of a disc name is the same as for a filename) and written to the directoru track. In addition, there is a display of the track being written or checked as formatting takes place — at least there is something to watch now! The problem of the computer 'hanging' when formatting discs has also been eliminated, as it was in the later 'corrections' for version 1.

EOF — In line with CLOSE, EOF has been extended to allow a stream number to be specified as an alternative to the filename for disc files.

FLREAD/FREAD — The internal operations of these two commands have been changed, resulting in the correction of a fault when using FOR. Whereas in version 1, a write always transferred the correct number of characters, filling with spaces if required, the input commands included a notional in the count. The result was that one extra character had to be requested to get the required number of characters read in. A secondary effect of this was that the read were not to be lost. The new version always returns the correct number of characters, adding a (CR) to the end if needed. No characters are now lost.

A further effect resulting from the change manifests itself when the FOR length does not contain sufficient values for the FREAD variables list. With version 1, the last value is repeated for unsatisfied variables in the list, resulting in a possible error if mixed strings and numeric variables are left. The new version returns null strings or zeros in this situation. (I have never used this capability, but the new strategy seems more consistent with what would be expected).

FREE — This now guarantees to return a positive value.

FWRITE — In version 1, it was not possible to use FWRITE in direct mode as a programming error caused all files to be closed each time a line was input from the keyboard or cassette. This error has been elimated and a direct FWRITE to a file allowed. It is also noticeable that the internal operations have changed (more of this later) as write operations are a little slower.

INPUT/LINEINPUT — The capability of these two commands has been extended to include input from disc files. The method of use is exactly as for tape input by using stream numbers (see OPEN).

LOAD — For the casual user, there appears to be no change to the LOAD command. However, for the more experienced user, a file type 3 (Segmented Binary) has been added to the type 1 (BASIC) and type 2 (Binary) formats. It is not possible to generate such a file directly from BASIC through SAVE, but it is now possible by using FWRITE or machine code. The file is similar to a number of type 2 files joined together, ending with a zero length 'entry block'. this allows, for example, a 'loading' screen to be displayed, the disc workspace to be skipped and the main program loaded, followed by an 'autostart' block by using a single LOAD command.

LOC/LOF — These have been corrected as for FREE, and always return a positive value. Also, as for EOF, LOC has been extended to allow the alternative of stream numbers (LOF is essentially meaningless without a filename). In addition, as the use of LOC is only sensible if a file is already being read, it has been changed to respond with ?NO if the file specified is not open or the control block is not in use.

OPEN — This command has been extended to include the ability to open a disc file, allocating a stream number in the range 1 to 10 (corresponding to the 10 file control blocks and used by CLOSE, EOF, INPUT etc). If the file is already allocated to a control block (even the one specified), an ?AO error is generated, while if the file is not open, but the control block is already in use a ?DN error occurs. In addition, using a non-valid mode of opening results in a ?FM error (note that this includes attempting to open a file for INPUT that does not exist). There are 4 modes of file opening:

1 INPUT the file must exist, but access is not restricted to reading!

0 OUTPUT the file is opened in the same way that FWRITE opens files

C CREATE mimics the operation of CREATE

E EMPTY KILLs an existing file and then CREATEs a zero length file

While this does not increase the facilities available for opening files, it does allow a specific control block to be allocated to the file for use by CLOSE, INPUT and PRINT. The overall result is that any combination of INPUT, FREAD, FWRITE, PRINT etc may be successfully used with files explicitly OPENed.

PRINT — With version 1, unpredictable results were obtained if PRINT £n was used with a value in the range 1 to 4. This has now been corrected and provided the control block is in use (which implies OPEN has been used), the command will work correctly. Values of n greater than 10 give a /DN error, while referencing a control block that is not in use gives a ?NO error. Note that PRINT is synonomous with FWRITE without FROM and FOR.

PROTECT — This now operates as described in the May 1985 corrections. If ON and OFF are both omitted, ON is assumed.

RENAME — Whatever the version 1 manual may say, RENAME never transferred a file from one disc to another, although the action/error if this was attempted was not consistent. This new version rejects an attempt to use two different drives when renaming a file, giving a consistent and correct response at all times. The command has also been extended to allow discs to be renamed without loss of data, so all your version 1 discs can be easily named. To use this feature, the 'oldfilename' parameter is replaced by the drive number, in the form # n.

SREAD/SWRITE — With version 1 of DRAGONDOS, an error was generated only if an attempt was made to read/write a track greater than 79, allowing 40 track drives to attempt to step beyond limits. With the new version, error trapping has changed and an error is normally generated if an attempt is made to step beyond the drive limits. However, if SREAD or SWRITE is used immediately following power on or CLOSE (ie before the directory is accessed), no track checks are performed. This provides a necessary facility to read/write non-DRAGONDOS discs.

VERIFY — This command operates in a similar fashion to PROTECT, in that ON is the default. Again the version 1 manual was incorrect in its description of this command, as the directory tracks (16 and 20) are always verified in both DOS programs, only the data track verification is affected. Note that the new version still verifies in the manner of SKIPF verifying cassette tapes — the data is checked for being readable and valid, it is not compared with memory.

That covers all the direct Basic changes. However, as I have hinted there are other changes including improvements in machine code address of discs and files.

Firstly, back to my statement on a more disciplined approach. Internally, disc I/O buffering has been modified so that information is not 'thrown away' unless necessary, ie when the differ needs to be used for another sector or the discs are being changed. Unlike version 1, it is *not* assumed that discs will be changed at any time the motor stops, although any buffers which have been modified are written at this time (and verified if VERIFY is ON, unlike version 1 which nver verified in this situation). However, because the buffers are still open, it is possible to write information to a buffer, after the motor has stopped, without the disc being accessed.

Also, as sectors are reserved for a file being written and are not returned at motor time out, disc space could be lost, and the new disc corrupted, if discs are changed at this time. With the new version, a disc change is assumed whenever all devices or all files on one drive are closed, the buffers are cleared and unused sectors returned at this time. This means that CLOSE (or END which calls CLOSE internally) *must* be used when discs are to be removed.

This need to call CLOSE does introduce one annoying feature, it has to be used between directory listings if discs are changed, to ensure the new disc directory is listed. If it is not, the 'old' disc directory may be supplied from buffered sectors! However, this usually only occurs when there are a few files on the 'old' disc.

A further result of the changed disc I/O handling is the availability of 'on demand' character I/O through the normal character handing routines at $B50A (for input) and $B54A (for output) by using the stream number in memory location 111 ($6F). Obviously, the files have to be opened first in the usual way. This means that disc files can be treated exactly as keyboard, cassette etc. with I/O errors trapped in the normal way through a vector in the error routine 'user hook' at $18E. This is a major improvement in disc filing handling.

Figure 1

```
OPEN "O",#n,"name" : POKE 111,n : LIST
```

Figure 2

```
OPEN "I",#n,"name" : POKE 111,n : EXEC 33658
```

Figures 1 and 2 give examples of what can be done with the new I/O handling described. The first is a means of producing a data format file of a Basic program (or part program); the second provides a "merge" facility for such data files.

Note that if the cassette is the selected stream and remembering to use 255 in the POKE, both examples will still work, giving a simple partial SAVE and MERGE for cassette users.

Table 2 — DOS entry table

address	routine/function accessed
$C004	General disc operation (restore, seek etc)
$C006	Address of data table for $C004
$C008	Validate filename and copy to "current drive block"
$C00A	Copy directory entry to control block
$C00C	Create directory entry, with backup
$C00E	Load end of file detail into control block
$C010	Find control block for drive and close file
$C012	Close file for control block specified
$C014	Load file into memory
$C016	Copy memory to file, verify if ON
$C018	Count free space on disc
$C01A	Kill file and free sectors
$C01C	Set file protection
$C01E	Rename file
$C020	Get directory record
$C022	Find free buffer and read sector
$C024	Copy updated directory sectors from track 20 to track 16
$C026	Read absolute sector
$C028	Write absolute sector, no verify
* $C02A	Verify absolute sector
* $C02C	Initialise disc
* $C02E	Disc error codes table base address

* new entry in table

As mentioned at the start, in addition to all disc errors now passing through the 'user error hook' at $18E, error handling has been dramatically improved, with the result that almost all errors are detected and trapped. In almost all cases where errors are undetected, it is becuase the error check that could be done has been suppressed for a good reason. For example, track limits are not cheked during DSKINIT (it is assumed that the numger of tracks are as specified) or beforfe a directory access has occured after CLOSE or power on. As track checking relies on the disc format information within the directory, this latter action allows non-DRAGONDOS format discs to be processed. Any directory access (DIR, file I/O etc.) loads the format for checking. This makes accessing different disc formats on one drive easy, as closing a disc clears the format information.

In other areas, error handling is more consistent; for example, null filenames are rejected for *all* commands, no head movement occurs if ?NR is generated and this latter error now occurs in about 15 seconds instead of 30. The only real problem is a write fail at motor time out, when the Basic error routine is still entered, even when running a machine code program, though this can be trapped through the user error hook.

Errors that have been corrected (which do not appear to have been published before) include:

1) Files on double sided discs could be processed incorrectly if immediately following the first disc access.

2) The first file control block was corrupted when sectors 19 to 36 of track 20 of a double sided disc were written.

3) The first file control block was corrupted whenever DIR was used.

4) File extensions could be appended to the *wrong file* if a large number of files were on the disc (more than 127), or if the master file record and the extension record were separated by more than three disc sectors.

The only change remaining, which affects machine code users, is that the routine entry table has been extended by three entries and the PROTECT/RENAME entries corrected. The list of routines now accessible is given in table 2.

In summary, I have found the new version very worthwhile, with no program changes needed (I always use the good programming practice of CLOSEing files before ending programs anyway) and programs fvor other machines using INPUT/PRINT easier to implement. However, perhaps I should add a word of warning at this point. I have found that *all well written programs* run successfully, but that those which use 'illegal' entries into DOS routines always fail. This, I am told, is because NONE of the routines in this new DOS start at the same address as the corresponding version 1.0 routines.

■

Acknowledgement: I am indebted to Phil Scott, who produced this new DOS, for supplying information on the internal workings of both DRAGONDOS and DRAGONDOS PLUS, and for the examples in figures one and two.

Dragonsoft

New software for review should be sent to *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Program: *Telewriter*
Supplier: Microdeal
Price: £9.95

I HAVE been using my Dragon 32 for three years and for the first two it was a games machine. Then I obtained a copy of Telewriter by Microdeal, and my whole life changed!

A word processor allows a useless typist to produce perfect copy every time. The problem of new lines is taken care of automatically by a feature known as 'word wrap'. This makes sure that a word is not split onto two lines on the screen. At any time it is possible to alter any character on the screen, delete whole lines, search for characters or strings, copy blocks of text to a new position, in fact to re-arrange the text how you like.

The disc version of Telewriter loads in a few seconds using the BOOT command; then you can choose between black characters on a green or a white background. The white background seems to work best on a colour television. The next choice is which version of Telewriter you are utilising. Four options are for specific printers, and the fifth is a general version which works with any printer. You then come to the first of three menus. All this becomes second nature after a few uses.

The first menu deals with saving and reading files on cassette, as well as accessing the disc menu and the format menu. The ten options are accessed by using the first letter of the command required. (E)dit moves the display to the high resolution screen, and you can start typing. The characters go onto the screen on 24 lines each of 51 characters. By using SHIFT you can type in true upper or lower case. While in Edit mode, the CLEAR key acts as a CONTROL key as is found on many other micros. Various functions are accessed by pressing CLEAR and one other key — for instance, CLEAR F(ind) allows you to search for a specific string of characters, CLEAR P(age) moves the cursor forward one page, CLEAR K deletes the current line. All the keys auto-repeat, except BREAK and ENTER. When you have finished typing, pressing CLEAR M(enu) sends you back to the first menu.

Pressing F in the first menu takes you to the Format menu, from which 'P' will send your work to the printer. The Format menu allows you to alter line length, left margin, top margin, line spacing, auto page numbering etc. from the default values. You can also arrange for only a part of the text to be printed. A typewriter mode allows you to type text to the printer line by line. If required control codes can be sent direct to the printer. The clever thing about Telewriter is that all these parameters can be embedded into your text so that they can be changed dynamically as the text is being printed.

This allows files to be saved or read in from a disc as well as a part file, or a file to be appended to one already in memory. Pressing C is the equivalent of DIR in Basic. Names of files can be changed or killed provided they have the Telewriter file extension TEX. Telewriter automatically adds this file extension to any file saved.

The main drawback of Telewriter is that the text is not What You See Is What You Get on screen. An 80 column display would be an advantage, but would need a good quality monitor to see the results clearly. The text can look peculiar particularly if you need more than 50 characters to a line, and the effect of codes to centre the text, underline, etc. are not apparent until printing takes place. The Format menu cannot be accessed directly from the Disc menu without entering the hi res screen and then the start menu. This can be tiresome.

The disc version allows files over 16000 characters in length and the cassette only version allows about 2000 more which is quite adequate for most home uses. The A4 size manual supplied is easy to follow and explains all the functions of the program giving examples where necessary. The keyboard response is now very good, and you do not lose characters when typing fast as happened on earlier versions. In 1983 the program cost £49.95 which put it out of the reach of many users but now it costs £9.95 (cassette or disc upgrade) it represents outstanding value for money.

Mike Hides

Dragon Answers

Dot vs. daisy

I AM considering buying for my Dragon 32, but I am not sure what sort I really need. I want to be able to list my Basic programs and perhaps do some word processing too.

Any advice you could give me would be gratefully received.

Arthur Cameron
Kings Norton
Birmingham

THE Dragon's printer interface is of the parallel kind, so you will need to check that any printer you are considering has a parallel interface as well (most do these days).

It seems your basic choice is between two types: the first is a Daisy Wheel printer, which prints like a typewriter, giving very high quality output. These are usually quite slow and can be expensive (although they start at under £200).

Alternatively, there are dot matrix type printers, which are faster and have the advantage of usually allowing screen dumps (graphics). However, the quality is not as good as a daisy wheel, as the characters are made up of individual dots. Some printers now offer NLQ (near letter quality) print, where the dots are much closer together.

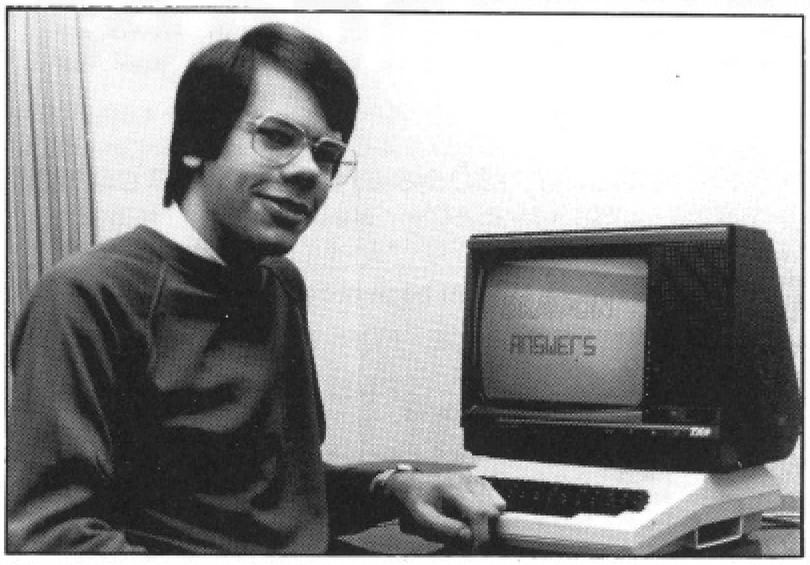
As a general purpose printer, the dot matrix is your best choice, but if you intend to do a lot of serious word processing then consider a daisy wheel type.

Mouse shortage

A FRIEND of mine has a BBC Micro and with this he uses a 'mouse' device to draw on the screen. Could you tell me if there is a company that makes a mouse for the Dragon and if so at what price?

Terry Porter
Sale
Cheshire

I DO not know of any company that (yet) makes a mouse for the Dragon. Why not consider a light pen instead? These are cheaper than a mouse and there are quite a few available for the Dragon. One of the better ones is the 'Datapen' from Datapen Technology at Kinsclere Road, Overton, Hants. (Tel. (0256) 770488. This costs £25.00 including VAT and p&p.



Blowing a fuse

THERE SEEM to be thousands of Dragon users transformed into ex-Dragon users by their transformers burning out. Contrary to popular belief, this can be fairly easily repaired. This is what you should do:

1 Take your faulty transformer into a radio repair shop.
2 Tell them to open it up by drilling out the rivets. (This is usually where the repair people get reluctant, but remember: what have you got to lose?)
3 Let them replace the fuse that has blown, most often the 12V one; usually, the actual transformer is in a beaming state!
4 Let them close the box with screws; the next repair will be so much easier!

DON'T try this yourself unless you're a professional. 240 volts is a killer. The whole job should take about half an hour and not cost more than £10.

PS If anyone is looking for Swedish/Finnish word processing software or software to access and download from electronic mailboxes, contact me!

Martin Vermeer
Punahilkantie 4 B 14
SF — 00820
Helsinki
Finland

MANY THANKS for all the letters on the subject of transformers — the moral is that they can be repaired BY PROFESSIONAL, COMPETENT PEOPLE. The mailbag strongly advised against amateur meddling — a point that cannot be made strongly enough.

Of course, new or reconditioned transformers are now available from a number of sources — Blaby and Peaksoft to name but two.

Less than zero

I AM writing a bank account program for my Dragon 64 and disc drive. The problem I have is when printing out money values such as £1.50 or £50.00, these appear as 1.5 or 50. How can I make the other zeros appear? Everything seems alright with numbers like £1.23.

Bill Legg,
Charfield,
Bristol

YOU NEED to use the PRINT USING command. Full details of this are given at the end of the Dragon Manual. This will allow you to have full control of output format. To get a variable (eg V) printed with two decimal places, you can use the following:

```
PRINT USING "££££.££";V;
```

Device channels

I HAVE recently built myself a serial interface to plug into the Dragon's cartridge port. All seems to work well, but to send data to it I have to use several POKEs from Basic.

I have a knowledge of 6809 machine code and would like to know if it is possible to link a new 'device' into Basic so that I could use the OPEN/CLOSE/PRINT commands with say a channel number -3.

Brian Smith
Inverness
Scotland

IT SHOULD certainly be possible to link new device channels into Basic. You will need to use the vectors at 350, 353 and 359. The first is called when a device is opened, the next when a device number is verified as legal, and the third whenever a character is to be output to any channel. See the firmware series in past issues of DU for more details on the firmware vectors and how to patch them.

Coding

I HAVE a RS232C 110 Baud Rate interface matched to a modified SCIA Data Link through the cartridge port of my Dragon 32. The test program checks out correctly. I now need to know the coding to transfer printer port operation to the cartridge port.

John Derry

THE actual code you will need to write will depend upon the configuration of your particular interface. However, the method of intercepting printer output is always the same.

This is achieved using the vector at 359, in a similar way to that described in previous issues for redirecting screen output. The following code should provide a basic outline for your code, simply EXEC the 'INIT' address once to set up the new printer driver.

```
INIT: LDA £$7E
   STA 359
   LDX £POUT
   STX 360
   RTS
POUT: PSHS A
   LDA 111
   CMPA £-2
   BEQ OUTC
   PULS A,PC
OUTC: PULS A
   LEAS 2,S
   * INSERT CODE TO PRINT CHARACTER
   RTS
```

Easy access

I HAVE recently been given a Dragon 64 as a birthday present and am writing a game for this in machine code. What I need to know is how to access the joystick ports in machine code — what hardware address are these located at and how do I interpret the values there?

Jason Davies

THE simplest way to read the joysticks in machine code is to call the ROM routine at 48466. This will leave the positions of joysticks 0-3 in locations 346 to 349. These will be the same values as are returned in Basic (ie between 0 and 63).

Epson made easy

***Pam D'Arcy** sticks a few handy labels in her Epson compatible printer*

WHETHER it will continue, who knows, but Epson has long been the printer industry standard. Cheaper printers, fortunately, are now available and many are described as 'Epson compatible', meaning that identical control codes are used to call up the bewildering array of options, including a number of readily available different-sized typefaces and character sets for nine different countries.

The options can be called from a Basic or machine code program by sending sequences of control codes to the printer, usually preceded by CHR$(27), known in the ASCII character set as the ESCape code.

Because of the bewildering array of options — and never being able to find the page I want in the Epson manual in a hurry — I worked out some time ago a couple of 'crib' sheets of the more commonly used options.

I am not in favour of repeatedly typing in CHR$(nn) statements because it is long winded and greatly increases the chances of a typing slip, so I also set up a 'base print' program (Listing one). Any time that a printing job needs doing (usually in my case a labels job) I take the 'base' program and add the specific print details to it, saving it in its own right in case I need it or something very similar again.

The PRINT BASE program simply consists of setting up the more commonly used CHS$ values and printer options in STRING VARIABLES, giving them memory jogging names where possible.

From Figure two I can then quickly find the names of variables that I would need to print informations in any of the readily available typefaces and densities. For instance, to print DRAGON USER in normal sized double strike (= darker print) italics, I would load in the PRINT BASE program, then add the line

1010 PRINT #-2,NN$;OD$;OI$:"DRAGON USER"; XD$;XI$

As can be seen from the table, the variable names are reasonably close to the option and are consistent (CN Condensed Normal; O set option ON; X set option OFF; D Double Strike; I Italics etc.).

As one cannot include a quotation mark as part of the text in a Basic variable string (as it is a string delimiter), a string variable (AQ$) has veen set up in readiness for it to be used (eg. for either side of DRAGON USER above):

1010 PRINT #-2,NN$;OD$;OI$;AQ$; "DRAGON USER" ; AQ$;XD$;XI$

The ZD$-ZU$ are the character sets for the different countries (the English set prints a pound sign for #). The last string (ZZ$) is an 'initialise the printer' string that clears the print buffer, switches off any of the options

Listing 1 — Print base program

```
10 REM BASE FOR AN EPSON PRINT PROGRAM
20 PCLEAR1
30 CLEAR6000
40 REM.......... MISC. VALUES
50 AA$=CHR$(1)
60 AB$=CHR$(0)
70 AE$=CHR$(27) :REM 'ESCape' CHARACTER
80 AM$=AE$+"!"
90 AP$=AE$+"p"
100 AQ$=CHR$(34):REM QUOTE CHAR
110 AS$=AE$+"S"
120 AU$=AE$+"-"
130 AXS$=AE$+"T"
140 AZ$=AE$+"R"
150 REM.......... FORMAT CODES
160 FB$=CHR$(8)   :REM BACKSPACE
170 FF$=CHR$(12)  :REM FORM FEED
180 FL$=CHR$(10)  :REM LINE FEED
190 FO$=AE$+"O"   :REM CANCEL SKIP OVER PERFS
200 REM.......... MODES
210 REM.................CONDENSED
220 CE$=AM$+CHR$(36)
230 CN$=AM$+CHR$(4)
240 REM.................ENLARGED ALONE
250 EE$=AM$+CHR$(40)
260 EN$=AM$+CHR$(32)
270 REM.................ELITE
280 LE$=AM$+CHR$(33)
290 LN$=AM$+CHR$(1)
300 REM.................NORMAL
310 NE$=AM$+CHR$(8)
320 NN$=AM$+CHR$(0)
330 REM.......... OPTIONS
340 OD$=AE$+"G":XD$=AE$+"H"
350 OI$=AE$+"4":XI$=AE$+"5"
360 OP$=AP$+AA$:XP$=AP$+AB$
370 OU$=AU$+AA$:XU$=AU$+AB$
380 OY$=AS$+AB$:XY$=AXS$
390 OZ$=AS$+AA$:XZ$=XY$
400 REM.......... CHAR SETS
410 ZD$=AZ$+CHR$(4)  :REM Danish
420 ZE$=AZ$+CHR$(3)  :REM UK (English)
POUND SIGN FOR #
430 ZF$=AZ$+CHR$(1)  :REM French
440 ZG$=AZ$+CHR$(2)  :REM German
450 ZI$=AZ$+CHR$(6)  :REM Italian
460 ZJ$=AZ$+CHR$(8)  :REM Japanese
470 ZP$=AZ$+CHR$(7)  :REM sPanish
480 ZU$=AZ$+CHR$(0)  :REM U.S.A.
490 ZW$=AZ$+CHR$(5)  :REM sWedish
500 REM.......... INITIALISE SEQUENCE
510 ZZ$=CHR$(24)+ZU$+NN$+XI$+XZ$+XU$ :REM
CLEAR BUFFER/USA CHAR.SET/NORMAL MODE/
ITALICS OFF/SUPER:SUBSCRIPT OFF/UNDERLINE OFF
1000 REM......... USER'S PRINT PROGRAM ADDED HERE
```

Listing 2 — Labeller program appended to Listing 1

```
1010 REM BASE LABEL PRINTING PROGRAM
1020 YC$=CHR$(126):REM COPYRIGHT SYMBOL
1030 YM$=AE$+"1"+CHR$(4) :REM LEFT MARGIN
1040 YZ$=AE$+":"+AB$+AB$+AB$+AE$+"%"+AA$+AB$+AE$+"&"+AB$+YC$+YC$+CHR$(&H8B)+CHR$
(&H7E)+CHR$(&H81)+CHR$(0)+CHR$(&H99)+CHR$(&H24)+CHR$(&H81)+CHR$(&H24)+CHR$(&H81)
+CHR$(0)+CHR$(&H81)+CHR$(&H7E)+CHR$(0):REM SETS UP COPYRIGHT CHAR.(YC$)
1050 SS$=AE$+"A"+CHR$(6):REM 1/2 NORMAL (THUS=1/12") SPACING
1060 SN$=AE$+"2"          :REM NORMAL 1/6" SPACING
1070 CLS:PRINT"LABEL PRINT PROGRAM"
1080 PRINT:PRINT"TESTPRINT"
1090 PRINT@128,""
1100 PRINT#-2,ZZ$;YZ$;YM$;FO$; :REM INITIALISE/SET UP (C) CHAR/LEFT MARGIN/CANCE
L SKIP PERF.
1110 GOSUB2100
1120 PRINT@128,"ENTER QTY IF OK";:INPUT NUM
1130 IF NUM=0 THEN1090
1140 PRINT:PRINT"PRINT RUN":PRINT:PRINT"     LABEL NUMBER"
1150 FORN=1TONUM:PRINT@272,N;:GOSUB2100:IFINKEY$<>""THENPRINT@320,"RUN HALTED":E
ND ELSENEXTN
1160 PRINT@203,"FINISHED":PRINT:PRINT"PRINT LABEL SAMPLE?"
1170 K$=INKEY$:IFK$=""THEN1170 ELSE IFK$<>"Y"THENEND
1180 GOSUB4130:GOSUB4000:END
2100 PRINT#-2,NN$;STRING$(10," ");EE$;OD$;"DISKPIX";XD$
2200 PRINT#-2,CN$;"     plus 3 DEMONSTRATION PROGRAMS on other side of tape"
2300 PRINT#-2,NN$;"     All require ";NE$;"CLOAD";NN$;" then ";NE$;"RUN"
2400 PRINT#-2,NN$
2500 PRINT#-2,NN$
2600 PRINT#-2,NN$
2700 PRINT#-2,NN$
2800 PRINT#-2,NN$
2900 PRINT#-2,CN$;" ";YC$;"1985 Pamcomms Ltd. 21,Wycombe Lane,Wooburn Green,Buck
s."
3000 PRINT#-2,NN$
3100 PRINT#-2,NN$
3200 PRINT#-2,NN$
3300 RETURN
4000 PRINT#-2,ZZ$
4010 PRINT#-2,NN$
4020 PRINT#-2,NN$
4030 PRINT#-2,NN$
4040 PRINT#-2,NN$;"          ";CN$;"COMPUTER PRINTED CASSETTE LABELS"
4050 PRINT#-2,NE$;OD$;"          from PAMCOMMS LTD";XD$
4060 PRINT#-2,NN$;"          ";OP$"Bourne End  26232";XP$
4070 PRINT#-2,NN$
4080 PRINT#-2,NN$
4090 PRINT#-2,NN$
4100 PRINT#-2,NN$
4110 PRINT#-2,NN$
4120 RETURN
4130 PRINT#-2,ZZ$;CN$;" 1 ";NN$;OP$;"Max. 4 lines above/2 below centre":XP$
4140 PRINT#-2,CN$;" 2 Condensed ABCDEFGHIJKLMNOPQRSTUVXYZabcdefghijklmnopqrstu"
4150 PRINT#-2," 3            vwxyz0123456789!"+CHR$(34)+"#$%&'()*+,-./:;<=>?@["+C
HR$(92)+"]"+CHR$(94)+CHR$(95)+CHR$(96)+CHR$(123)+CHR$(124)+CHR$(125)+CHR$(126)
4160 PRINT#-2,CN$;" 4 Elite     ";LN$;"ABCDEFGHIJKLMNOPQRSTUVWXYZabcdef"
4170 PRINT#-2,CN$;" 5 Normal    ";NN$;"ABCDEFGHIJKLMNOPQRSTUVWXYZa"
4180 PRINT#-2,CN$;" 6 Cond. Enl.";CE$;"ABCDEFGHIJKLMNOPQRSTUVW"
4190 PRINT#-2,CN$;" 7 Elite enl.";LE$;"ABCDEFGHIJKLMNOP"
4200 PRINT#-2,CN$;" 8 Enlarged  ";EN$;"ABCDEFGHIJKLM"
4210 PRINT#-2,CN$;" 9 Italics   ";NE$;OI$;"ABCDEFGHIabcdefghi012345678";XI$
4220 PRINT#-2,CN$;"10 ";OY$;"SUPERSCRIPT - top 1/2 of line as in squared nos.";S
TRING$(48,FB$);OZ$;"SUBSCRIPT   - bottom 1/2 of line as in chemical formulae";XZ
$
4230 PRINT#-2,NN$
4240 PRINT#-2,NN$
4250 RETURN
```

that may have been set that can only be cancelled by specifically unsetting them, sets the typeface to 'normal' and the most commonly used character set (USA).

Listing two are the lines of a program added to Listing one to form a general label printing program. It is my basic, general label printing program. Lines 2100-3200 are lines 1-12 respectively of the most commonly printed label that I use — cassette labels on a roll. Only ten lines can be printed on the label itself; the other two lines represent the spacing between labels. I simply EDIT lines 2100-3000 as required to produce a specific cassette label program and save it as such. (As can be seen, it is the actual program I use to print DISKFIX software cassette labels). If I need to print labels of less depth, I simply REM out or DELete the excess PRINT lines; longer labels simply require a few additional PRINT lines before the RETURN.

The program looks more complicated than any you may need as it makes use of the ability to replace any of the characters with one's own creation. Lines 1020 and 1040 create a copyright symbol in place of existing character 126 (a squiggle to me in the Epson set — it probably has an official name!). Additionally, although not used in this example, lines 1050 and 1060 set up strings to enable the line spacing to be adjusted (for instance, being an even number of normal print lines — six to an inch — if it was required to print exactly half way down the label, five and a half 'normal' line feeds would be needed before and after the line itself).

Line 1030 sets the left margin — just adjust the figure in the brackets as required. Line 1100 includes switching off the 'skip over perforations' option that would cause havoc if left switched on in a label print program!

The run commences with a simple 'testprint' option that prints a single label to enable the alignment to be properly set up/new creations to be checked before diving into printing hundreds of labels. Line 1100 initialises the printer for this label run (ZZ$ as mentioned previously, plus substitute copyright character for CHR$(126) plus left margin plus turn off skip over perforations).

Lines 2100-3300 are the label print subroutine proper.

Once the number of labels required has been entered, on a Dragon 32 the printing can be terminated at the end of printing the current label by holding down the space bar or other key (not shift alone). There seems to be a bug in the Dragon 64 that I haven't seen mentioned to date, in that printing cannot be interrupted as on the 32 (LLIST/BREAK, for instance, does not respond on a 64). Similarly, one cannot get in to prematurely terminate label printing, so to press RESET is an easy option.

After the run is completed without interruption, a sample label (subroutine lines 4130-4250) showing some of the typefaces that can be obtained will be printed out by answering Y to the prompt. The square brackets (line 4150) are obtained by SHIFT plus DOWN and RIGHT ARROW keys. Subroutine lines 4000-4120 prints on the cassette label 'centre' only, and contains an example of proportional printing (the telephone number line).

This may all make the mysteries (and treasures) of an Epson or Epson compatible printer look more complicated than ever, but once you have had a play, I am sure that you will find the base program and crib sheets useful acquisitions!

Figure two I find particularly useful for doing the odd command direct from the keyboard. For instance, to LLIST the program in emphasised print for submission with this article, I simply typed in

PRINT #-2,CHR$(27);CHR$(33);CHR$(8) ⟨ENTER⟩

(then PRINT #-2,"title":LLIST⟨ENTER⟩. The semicolons (or use +) are important, otherwise the command sequences will not be recognised.

Figure 1 — Epson options as basic variables

			OPTIONS					
			Once set, remains set until unset or new mode selected		Once set, remains set until unset			
	Chars per inch	To select mode	Proportional (printed in emphasized; ignores dble.strike & super/subscript)	Double strike	Italics	Super-script (printed in double strike; ignores emphasized)	Sub-script (printed in double strike; ignores emphasized)	Under-line
Condensed	17	CN$	X					
Elite	12	LN$	X					
Normal (Pica)	10	NN$	To set: OP$	OD$	OI$	OY$	OZ$	OU$
Normal emphasized	10	NE$	To unset: XP$	XD$	XI$	XY$	XZ$	XU$
Condensed enlarged	8.5	CE$	X					
Elite enlarged	6	LE$	X					
Enlarged	5	EN$						
Enlarged emphasized	5	EE$						

Figure 2 — Epson options as decimal codes

```
(page given is page in Epson manual)
27 33 0      p.32  Normal
27 33 1            Elite
27 33 4            Condensed
27 33 8            Normal   + emphasized
27 33 16           Normal               + double strike
27 33 17           Elite                + double strike
27 33 20           Condensed            + double strike
27 33 24           Normal   + emphasized + double strike
27 33 32           Enlarged
27 33 33           Elite enlarged
27 33 36           Condensed enlarged
27 33 40           Enlarged + emphasized
27 33 48           Enlarged             + double strike
27 33 49           Elite enlarged       + double strike
27 33 52           Condensed enlarged   + double strike
27 33 56           Enlarged + emphasized + double strike

Once set, these options remain set until specifically unset:
27 112 1     p.104 Proportional    on (normal & enlarged faces only;
                   ignores double strike+super/subscript settings
27 112 0           Proportional    off
27 52        p.25  Italics         on
27 53                              off
27 83  0     p.92  Superscript     on
27 83  1     p.93  Subscript       on
27 84        p.94  Super/subscript off
27 45  1     p.55  Underline       on
27 45  0                           off
Select character set:
27 82 0      p.90  U.S.A.
27 82 1            France
27 82 2            Germany
27 82 3            U.K.(pound sign for #)
27 82 4            Denmark
27 82 5            Sweden
27 82 6            Italy
27 82 7            Spain
27 82 8            Japan
Miscellaneous:
10           p.10  line feed
12           p.12  form feed
8            p.7   backspace
7            p.6   bel(1)
27 48        p.21  1/8" line spacing
27 49        p.22  7/72" "      "
27 50        p.23  1/6"  "      "
27 51 n      p.24  n/216" (n = 1 - 255)
27 64 n      p.65  n/72"  (n = 1 - 85)
27 68 n n 0  p.69 set horizontal tabulations
9            p.9  TAB to next HT
27 56        p.31 deselect paper out (for lower print on cut sheets)
27 79        p.87 cancel auto-perforation skip
                  (Telewriter does its own if B option used)
```

DRAGON FORTH

***Brian Cadge** traces the history of FORTH and reviews the NDUG package*

IT IS perhaps more accurate to describe FORTH as a programming environment, rather than a strict programming language. It exists in the two opposing states at once — that of compiler and interpreter.

FORTH was first conceived in 1967 by Charles Moore at the Stanford Linear Accelerator Centre. It evolved from work he was doing using an IBM 1130 (one of the first fully 'interactive' computers). The FORTH interpreter was written in the ALGOL programming language, and the compiler in FORTRAN.

Moore saw his invention as a fourth-generation computer language and so named it FOURTH. However, the IBM 1130 he was using only allowed filenames to upto 5 characters, so the name got shortened to FORTH, and it stuck.

A completed FORTH programming language appeared in 1970, at the National Radio Astronomy Observatory (NRAO) in Arizona. Over the next three years, Moore continued to develop FORTH at NRAO, until in 1973 the demand for FORTH from other astronomers persuaded him and several others to leave NRAO and set up 'FORTH Incorporated'.

By 1975, FORTH had developed into a general purpose programming language, and another group had been formed for interested programmers and users called the 'FORTH Interest Group' (FIG). In 1976, the committee of the International Astronomical Union adopted FORTH as the standard programming language for astronomy.

In 1979 Moore estimated that there were now over 1000 FORTH programmers, and that the number was doubling at least every year. Since the introduction of mass market microcomputers, the number of FORTH users has grown exponentially.

Dialects

As with so many programming languages, there are a number of different 'dialects' of FORTH availble. The main standards are those of FORTH Incorporated ('FORTH-79'), and the FORTH Interest Group (FIG-FORTH). The FORTH-79 standard has recently been updated in the form of the FORTH-83 standard. Most of the functions available in the two main standards are identical, the difference are in the names chosen for the commands. Hence a program written for one standard can usually quickly be converted for use in another.

FIG now claim that a version of FORTH is available for just about every central-processing unit in existence. For example, the 8080, 8088, Z80, 6800, 6809, 1802, 6502, 8086, Z8000 and 68000, are just some of the more popular 8 and 16 bit CPUs for which FORTH is available. The popularity of FORTH on smaller computers is due to a number of factors, which were then not common to all programming languages.

The main attraction of FORTH is its speed, indeed one of the main design aims of FORTH was rapid program execution as it was developed for real-time applications such as controlling telescopes. FORTH is just about as close as one can get to the programming speed of assembler, while staying within an interactive programming 'language', (rather than a compiler).

Structure

As FORTH was intended for use on dedicated computers, the system is very compact, most implementations use only about 8-10k of memory. The trade-off comes with the lack of any floating point and sophisticated file handling. These can, however, be added if required, as another attribute of FORTH at its extensibility. Another price to be paid for FORTH's speed is its lack of error trapping. A 'bug' in a program can cause the whole system to crash, so careful step by step testing of code is essential.

The FORTH language is unlike most other languages. Its structure is quite different from that of PASCAL, COBOL or C. It is neither an interpreter nor a compiler, yet it can be either or both at the same time.

A command can be typed at the keyboard, and FORTH will interpret it and execute the required action immediately, thus acting as an interpreter (as with Dragon Basic). Conversely, definitions may be entered for FORTH to convert to internal code, to be executed at a later date, hence acting as a compiler.

When developing a program, it is useful to be able to try out sections of code independently and interactively, to 'fine tune' the code, this is the main justification for interpreters. However, the finished program should run as fast and efficiently as possible, hence the justification for compilers. FORTH is an attempt to be the best of both worlds by being a semi-compiled language with an interpreter.

One of the main features that distinguish so called high level languages is whether or not the language is structured. Good 'control structures' are essential for clear, efficient programming. Such languages as BASIC, COBOL and FORTRAN lack many of these control structures, yet FORTH, like PASCAL, offers all the standard ones such as BEGIN — WHILE — REPEAT. Unlike PASCAL, FORTH allows the user to create their own control and data structures.

FORTH is very much a 'bottom up' design language. It appears difficult to understand on first sight, but once the basics are understood, programming in FORTH becomes easier and easier. Words defined for use at a low-level in one application can often be used within other programs, making programming more efficient in the long term.

Programs written in FORTH are often easier to debug than programs written in other languages. Changes may be made at any level within a program without having to modify the whole program. However, the lack of any error trapping and post-mortem information is a drawback here.

Current applications of the FORTH language still include its use in real-time control. For example, 'Elican Inc' used FORTH to control camera systems used for filming the special effects in 'Star Wars', and 'Magican Inc' used a similar system in the 'Star Trek' series of films.

Many of the latest video arcade games produced by Atari were written in a specialised version of the language called GameFORTH. The Cedar Sinai Medical Centre in Los Angeles uses a multitasking version of FORTH to control its data processing applications.

Languages with structures similar to FORTH are correctly known as Threaded Interpretive Languages. Since the introduction of FORTH, a number of spin off languages have appeared. These have mainly been specialised versions of FORTH and have not generally gained much support. Examples of such languages are STOIC, IPS and PISTOL.

Stack orientated

There are a number of versions of FORTH available for the Dragon computer. One of the latest, and the one I used for this article, is from the National Dragon Users Group. This version seems to be based on the FIG standard with some changes to make it easier to use on the Dragon. I will look at the special features of this particular version in a moment, but firstly a very brief overview of programming in FORTH.

FORTH is an entirely stack orientated language. A stack is simply a last-in, first-out buffer containing, in this case, integer values. FORTH maintains two stacks, known as the parameter and return stacks. The parameter stack is used by the programmer to pass values between commands, and to obtain reults. FORTH operates with Reverse Polish Notation (RPN) on all of its arithmetical and logical operations.

Briefly, RPN can be explained as follows. The normal way of writing down an expression such as '5+3=' is technically known as infix. The infix method is used by almost all pocket calculators and most programming languages (including BASIC). It is the most straight forward and natural form of expression for humans, but for computers it is not.

The equivalent of 'infix' for computers is RPN. The expression above would be rewritten in RPN as '5 3 + ='. In other words, the two operands of an expression are typed first, followed by the operator. As a further example, consider the infix expression '3+7*8', it is not clear if the result required is '(3+7)*8' or '3+(7*8)'. This ambiguity is not present in RPN, the expressions become obvious — '3 7 + 8 *' and '7 8 * 3 +'. Hence in RPN there is no need for complicated bracketed expressions.

Forth commands are called words and are executed sequentially as typed.

For example, the FORTH word '+' takes two numbers from the top of the parameter stack, adds them, and leaves the result back on the parameter stack, and the word '.' causes the top value on the stack to be displayed. Hence entering '7 11 + ' . would result in FORTH responding 18 OK.

FORTH 'programs' are built up of lists of words. For example, to make a telephone call requires the following actions to be carried out:

LIFT-RECEIVER WAIT-FOR-TONE DIAL-NUMBER WAIT-FOR-REPLY

and so on. Actions such as DIAL-NUMBER can be further subdivided as follows:

PLACE-FINGER-IN-REQUIRED-HOLE TURN-DIAL RELEASE-DIAL

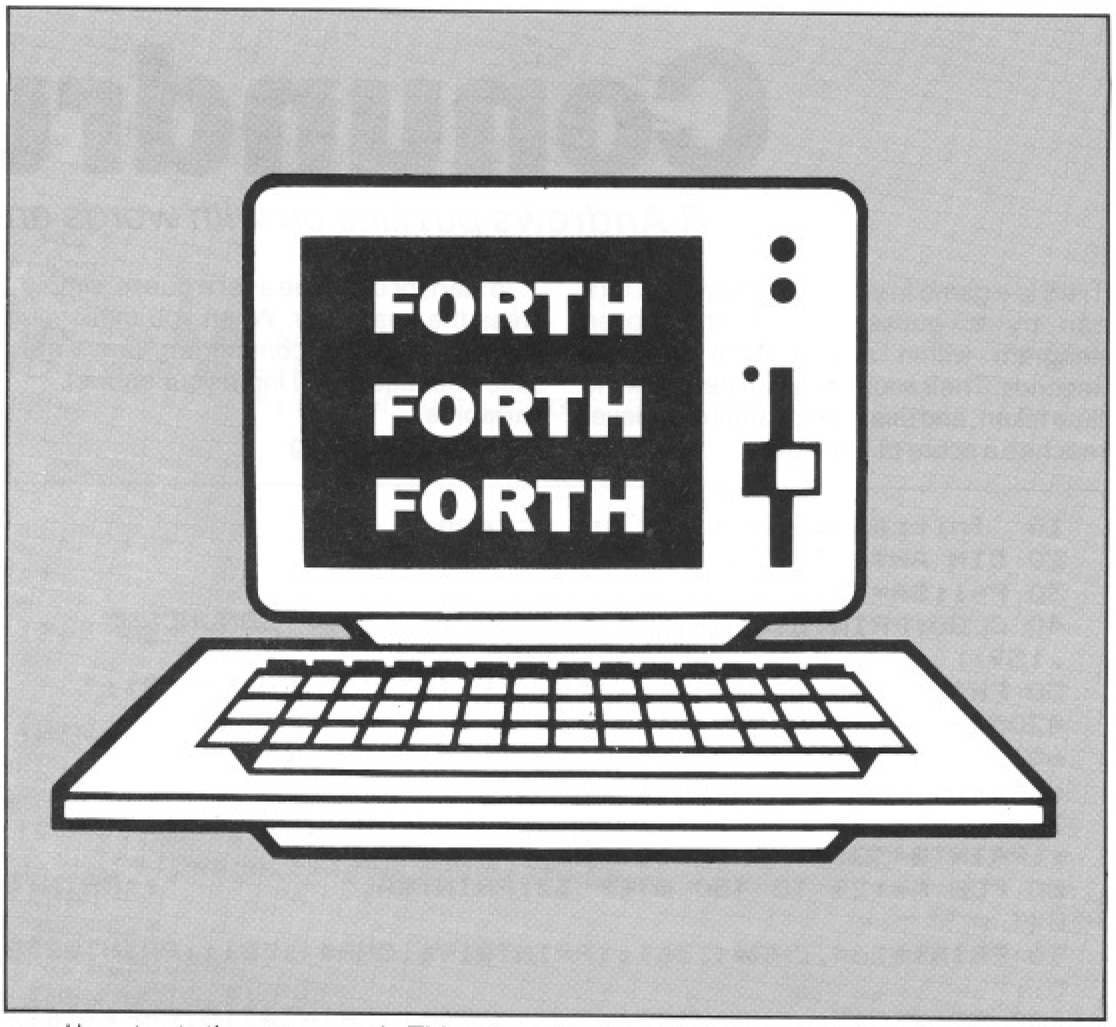
To write a FORTH program to make a phone call would first of all involve constructing words to carry out the basic tasks, such as 'TURN-DIAL'. These are defined in terms of the predefined FORTH words (of which '+' is an example). Once these have been written, the next level of words can be defined in terms of these basic constructs (words such as 'DIAL-NUMBER'), and finally a single word, for example 'MAKE-CALL', could be defined to carry out the whole task of making the call.

FORTH words are stored in a dictionary, and within this dictionary there may be several vocabularies. A vocabulary will simply contain words which are in some way connected or similar. It is upto the programmer as to within which vocabulary a word will be stored. There are two vocabularies predefined, called 'FORTH' which contains most of the predefined words, and 'EDITOR' which contains words to edit FORTH programs on disc.

Return stack

Hence FORTH is often an ideal language for tasks that can be broken down into simpler and simpler constituent parts. The FORTH system is acting as an interpreter when instructions are executed immediately after being typed (as in the example for addition above), and as a compiler when instructions are stored as new definitions (new words) to be executed later, perhaps as part of another word.

With the ability to call words within words to any reasonable degree, FORTH obviously needs some method of keeping track as to where it is within a program. For this it uses the return stack. Whenever execution of a new word starts, the position from where that word was called within another



word is put onto the return stack. This value is held in a FORTH variable known as the Instruction Pointer (as it points to the next instruction to be executed). Once its value has been put onto the stack, the location of the new word is loaded into it and execution continues from there. When the word finishes, FORTH knows where to continue from by taking the value from the top of the return stack and loading it into the Instruction Pointer (this is similar to the operation of the CPU itself).

The FORTH system also uses this stack for internal use when compiling constructs such as loops, and conditional clauses. Often, the programmer will not be concerned with the return stack at all as all user information is passed via the parameter stack.

The version of FORTH available from the Dragon User Group contains a number of extra goodies in addition to those required for the standard. The system is loaded via the BOOT command (on DragonDOS) or simply switching on the computer (DeltaDOS). Once the language is ready, you can load in some extra commands from the disc. These are saved as FORTH screens on the disc in their source form so you can have a look at them if you want to. The most useful extra is a 51 column screen driver and screen editor/word processor. You can also switch to an 85 character/line display, which can be useful for seeing how a printed document will look on screen. This mode is quite readable on a monitor but rather hard on a normal colour television.

A standard FORTH screen is made up of 16 lines of 64 characters (1K), but this would be difficult to edit on the Dragon's screen, so NDUG FORTH uses a screen block size of 256 characters (one disc sector) which means a whole FORTH screen can be edited on screen at once.

In addition to the word processor type editor, NDUG FORTH also comes complete with a Turtle Graphics extension. This seems to be quite well implemented and does not suffer from the usual deathly slow reaction speeds of Turtle graphics. Demonstration screens of the editor and turtle graphics can also be loaded from the disc.

A very useful extra word is 'B' used to call Dragon Basic commands (in the Basic ROM), for example, to set the screen mode you can use B (PMODE4,1:SCREEN1,0). Hence all of the Dragon's graphics and sound features are fully available to NDUG FORTH programs. In addition, functions such as line and box drawing and GET/PUT functions are implemented directly in FORTH which means they run even faster (theoretically) than in BASIC.

The manual I have is only a pre-production draft, but seems well written and straight forward. It does not, however, attempt to teach you how to program in FORTH for that I suggest you take a look at some of the books mentioned below. If you're interested in using this fascinating language on your Dragon then NDUG FORTH is highly recommended.

System Used: NDUG FORTH (DragonDOS or DeltaDOS).
Price: £9.75 (inc P+P).
Supplier: NDUG, 6 Navarino Road, Worthing, Sussex (Tel: Worthing 207585).

Forth Books: *Starting FORTH* by L. Brodie.
FORTH Techniques by Olney and Benson.
Discover FORTH by Hogan.
FORTH Tools & Applications by Feierbach.
The Complete FORTH by Winfield.

Conundrum

***R Andrews** puzzles on with words and letters*

THIS is a game in which two players in turn can try to guess a randomly chosen anagram within a time limit of thirty seconds. Their score is calculated from the time taken, and this goes on until one player reaches a score of 300 points.

To start, or continue after a guess, simply press the space bar. When you think you have guessed the conundrum, press the space bar again and input your answer.

Variables

AW$ Anagram string
OW$ Randomly picked word
P Player to go
SA Player A's score
SB Player B's score
E Length of anagram
D Position of letter in anagram

```
10 'Initialise and set up screen
20 DIM AW$(10),D(10)
30 P=1:SA=0:SB=0
40 CLSO:PRINTSTRING$(33,159);"          CONUNDRUM           ";STRING$(33
,159);
50 PRINT@141,STRING$(6,159);:PRINT@173,CHR$(159);"    ";CHR$(159);:PRINT
@205,STRING$(6,159);
60 PRINT@266,STRING$(12,159);:PRINT@298,CHR$(159);"          ";CHR$(159)
;:PRINT@330,STRING$(12,159);
70 PRINT@394,STRING$(12,159);:PRINT@426,CHR$(159);"          ";CHR$(159)
;:PRINT@458,STRING$(12,159);
80 FOR A=129 TO 450 STEP 32:PRINT@A,"        ";:PRINT@A+22,"        ";:N
EXT A
90 PRINT@164,CHR$(136);:PRINT@196,CHR$(138);:PRINT@228,CHR$(131);CHR$(13
5);-
100 PRINT@186,CHR$(137);CHR$(134);:PRINT@218,CHR$(142);CHR$(135);:PRINT@
250,CHR$(131);CHR$(131);
110 PRINT@290,"SCORE";:PRINT@312,"SCORE";
120 PRINT@417,"YOUR GO";
130 'Main loop
140 GOSUB 200
150 GOSUB 280
160 PRINT@322,SA;:PRINT@344,SB:
170 GOSUB 380
180 GOSUB 440
190 GOTO 190
200 FOR AN=1 TO 10
210 D(AN)=RND(10)
220 IF AN=1 THEN GOTO 250
230 FOR AC=1 TO AN-1
240 IF D(AC)=D(AN) THEN GOTO 210 ELSE NEXT AC
250 NEXT AN
260 RETURN
270 'Set up anagram
280 IF P=1 THEN A=(SA/2)+RND(15)+RND(35)
290 IF P=2 THEN A=(SB/2)+RND(40)+RND(10)
300 RESTORE
310 FOR B=1 TO A:READ OW$:NEXT B
320 E=LEN(OW$)
330 FOR C=1 TO10
340 AW$(C)=MID$(OW$,D(C),1)
350 NEXT C
360 RESTORE
370 RETURN
380 A$=INKEY$:IF A$="" THEN 380 ELSE 390
390 FOR F=1 TO 10
400 PRINT@298+F,AW$(F);
410 NEXT
420 RETURN
430 'Timer
440 T=30
450 FOR I=30 TO 1 STEP-1
460 TIMER=0
470 PRINT@174,T;
480 A$=INKEY$:IF A$<>""THEN PLAY"CEG":GOTO 660
490 PLAY"T15V10P5DV5CV20"
500 IF TIMER>50 THEN GOTO 510 ELSE 480
```

```
510 T=T-1:NEXT
520 PLAY"V20"
530 PLAY"V30C"
540 GOTO 660
550 PRINT@427,OW$;
560 'Prepare player for word
570 IF K<>E THEN PLAY"T10CCC"
580 IF P=1 THEN P=2 ELSE P=1
590 A$=INKEY$:IF A$=""THEN 590 ELSE 600
600 IF P=1 THEN PRINT@417,"YOUR GO"::PRINT@439,"         ";
610 IF P=2 THEN PRINT@417,"         "::PRINT@439,"YOUR GO";
620 PRINT@299,"          ";
630 PRINT@427,"          ";
640 GOTO 150
650 GOTO 650
660 SOUND 50,1:SOUND 30,1
670 'Input word sequence
680 IF P=1 THEN PRINT@417," WELL?  "; ELSE PRINT@439," WELL?  ";
690 A=427:FOR H=1 TO E
700 PRINT@A,CHR$(128);
710 A$=INKEY$:IF A$="" THEN 710
720 IF A$=CHR$(8) THEN PRINT@A," "::GOTO 1000
730 PRINT@A,A$::A=A+1:G=A-427:G$(G)=A$:NEXT H
740 PRINT@437,CHR$(159);CHR$(128)::PRINT@447,CHR$(128);
750 FOR J=1 TO E:IF G$(J)=MID$(OW$,J,1)THEN K=K+1:NEXT J
760 IF K=E AND P=1 THEN SA=SA+T
770 IF K=E AND P=2 THEN SB=SB+T
780 K=0:IF K=E THEN PLAY"T25CEGCEG"
790 IF SA>300 OR SB>300 THEN GOTO 910
800 GOTO 550
810 REM Data
820 DATA ENGLAND,IRELAND,SCOTLAND,WALES,ALBANIA,ALGERIA,AUSTRIA,BELGIUM,
BOLIVIA,BRAZIL,BULGARIA,BURMA,CANADA,CEYLON,CHILE,CHINA,COLOMBIA,CUBA,CY
PRUS,DENMARK,ECUADOR,EGYPT,ETHIOPIA,FINLAND,FRANCE,GERMANY,GHANA,GREECE,
HUNGARY,ICELAND
830 DATA INDIA,IRAQ,IRAN,ISRAEL,ITALY,JAMAICA,JAPAN,JORDAN,KOREA,LEBANON
,MALTA,MEXICO,MOROCCO,HOLLAND,NIGERIA,NORWAY,PAKISTAN,PARAGUAY,PERU,POLA
ND,PORTUGAL,RUMANIA,SPAIN,SWEDEN,THAILAND,TONGA,TRINIDAD,TUNISIA,TURKEY,
URUGUAY,VATICAN,VIETNAM,ZAIRE
840 DATA KABUL,TIRANE,VIENNA,BRUSSELS,BRAZILIA,TORONTO,PEKING,PRAGUE,CAI
RO,LONDON,HELSINKI,PARIS,BONN,BERLIN,ATHENS,BUDAPEST,DEHLI,BHAGDAD,TEHRA
N,DUBLIN,ROME,KINGSTON,TOKYO,SEOUL,VADUZ,AUCKLAND,OSLO,LIMA,WARSAW,LISBO
N,MADRID,BERNE,MOSCOW,CARDIFF
850 DATA ANDORRA,SUDAN
860 DATA ABERDEEN,BELFAST,LEEDS,BRISTOL,PLYMOUTH,CORK,LILLE,CALAIS,BOULO
GNE,ORLEANS,BORDEAUX,NICE,MONACO,DIJON,LYONS,ANTWERP,ESSEN,COLOGNE,MUNIC
H,HAMBURG,BREMEN,AACHEN,SALZBURG,ZURICH,GENEVA,BILBAO,GRANADA,VALENCIA,M
ILAN,NAPLES,TURIN,BOLOGNA,VENICE
870 DATA GDANSK,LEIPZIG,MALMO,KIEV,ODESSA,ANKARA,SOFIA,DAMASCUS,TRIPOLI,
DENVER,DALLAS,HOUSTON,MIAMI,BOSTON,CHICAGO,DETROIT,SEATTLE
880 DATA EXETER,TORBAY,WEYMOUTH,BRIGHTON,HASTINGS,DOVER,MARGATE,TAUNTON,
MINEHEAD,SWINDON,READING,LUTON,OXFORD,IPSWICH,WARWICK,BANBURY,NORWICH,ST
AFFORD,DERBY,BOSTON,SKEGNESS,LINCOLN,CREWE,CHESTER,BRADFORD,HULL,YORK,WH
ITBY,DURHAM,KENDAL,KESWICK
890 DATA DOUGLAS,CARLISLE,HEXHAM,BERWICK,PEEBLES,DUMFRIES,GLASGOW,STIRLI
NG,DUNDEE,PERTH,PETERHEAD,THURSO,MONMOUTH,PWLLHELI,HOLYHEAD,CARDIGAN,SWA
NSEA,LERWICK,BARROW
900 'Winners routine
910 IF SA>300 THEN PRINT@33,"      PLAYER ONE HAS WON"; ELSE PRINT@33,"
      PLAYER TWO HAS WON";
920 PLAY"O1T6CDFECO2"
930 PLAY"P1P1P1P1"
940 PRINT@33,"PRESS ANY KEY FOR ANOTHER GAME";
950 A$=INKEY$:IF A$="" THEN 950 ELSE 960
960 PRINT@33,"          CONUNDRUM          ";
970 SA=0:SB=0:P=1
980 PRINT@322,"     "::PRINT@344,"     ";
990 GOTO 600
1000 A=A-1:H=H-1:GOTO 700
```

Winners and Losers

Every month, Gordon Lee will look at some prize programming points from a previous month's competition

HERE WE go again — time for another pick from the postbag of entries for the September competition puzzle. The problem was to find all possible eight-digit cubes that, be deleting one digit in turn, will produce in sequence a prime, a multiple of 7, a prime, a perfect square and finally another prime.

There were two possible solutions:

13651919	and	55306341
1365919		5306341
136591		530341
13691		50341
1369		5041
139		541

A number of entrants suggested a third solution, even though this was a repeat of the second of the two solutions already given. This is because a second identical sequence is generated depending on which of the two leading fives is deleted first. This could not really be classed as a distinct solution.

Not deterred, one reader, who to spare his blushes I won't identify, even suggested that there were four different solutions. Closer inspection revealed that his program had accepted as prime the values 501 and 553041, both of which are divisible by three. By examining the listing the fault was soon traced to the 'prime check' section of the program. The method that he had adopted was to eliminate all values that were even or which ended in '5'. He then tested for divisibility by three means of the 'digital root' method. That is, if the sum of the digits of a number is divisible by three, then the number is also divisible by three. Having put the number to be tested into string A$, he used the following routine:

```
SUM=0
FOR A3=2 TO LEN(A$)
SUM=VAL(MID$(A$,A3,A3))
NEXT A3
```

The errors, for there are two of them, are to be found in the third line which should have been:

```
SUM = SUM+VAL(MID$(A$,A3,1))
```

I will leave readers to work out for themselves the important differences, but this is a case in point where, perhaps due to a moment's inattention, a simple but vitally important error can creep in. On the whole it would have been simpler (and quicker) to use the single line test:

```
IF A/3 = INT(A/3) THEN ...
```

The testing for primes was the aspect of the competition which gave the most difficulty — an aspect which Phil Sapiro of Liverpool describes as 'a bit of a drag'. Well, Phil, I bet you didn't find it as much of a drag as Austan Henderson of Bromsgrove, whose listing includes all primes up to 3163 typed in by hand (presumably from a table of primes)! Many entrants adopted all manner of exotic tests for primality. That they worked I don't doubt, but are they any quicker than a straightforward prime test? I don't know.

To return to basics, a prime number is one that does not have any whole number factors except itself and one. Therefore, if a number under test is tested by a series of trial divisions its primality, or otherwise, can be established. The method is simple, but repetitious, and this is where the computer can help us. Fortunately, there are a number of other considerations which can help. For example, it is only necessary to use trial divisors up to the square root of the number under test. Clearly, if any factors exist they will occur in pairs, one factor less than the square root, and the other greater (unless, of course, the number is a perfect square, in which case both factors would be the same). It is also only necessary to divide by prime numbers, although, at a pinch, dividing by two, and then all *odd* numbers will do almost as well!

Listing A

```
1000 INPUT N:FL=0
1010 IF N/2=INT(N/2)THEN FL=1:GOTO 1050
1020 FOR F=3 TO SQR(N)+.5 STEP 2
1030 IF N/F=INT(N/F)THEN FL=1:GOTO 1050
1040 NEXT F
1050 IF FL=0 THEN PRINT"PRIME" ELSE PRINT"COMPOSITE"
```

Listing B

```
  10 DIM P(446)
  20 P(1)=2:P(2)=3:N=5:S=3
  30 GOSUB 5000
  40 IF FL=0 THEN P(S)=N:PRINT P(S),S:S=S+1
  50 IF S>446 THEN 100 ELSE N=N+2:GOTO 30
 100 REM Rest of Program Here
4999 END
5000 REM Prime Test Subroutine
5010 FL=0:L=SQR(N)+.5:V=1
5020 IF P(V)>L THEN 5050
5030 IF N/P(V)=INT(N/P(V)) THEN FL=1:GOTO 5050
5040 V=V+1:GOTO 5020
5050 RETURN
```

These methods are reflected in the two listings given, one simple but slower, the other a bit more complex, but, once the initial array of test primes has been generated, a method that is a bit quicker.

In listing A, the number under test (N) is divided first by 2 to reject it if it is even, and then by a sequence of ascending odd numbers. If a factor is found the flag (FL) is reset to 1 and the test ends. This listing would probably be adequate where only a few numbers need to be tested, or if the numbers under test are comparatively small. For larger numbers, or where many numbers need to be tested, then listing B would probably be the most efficient.

In this program the array P(446) is used to store the values of all primes in the range 2 to 3162. If you didn't know that there were 446 numbers in the list by checking the table of primes, then you could always make an estimate for the size of the array (subject, of course, to the memory available). Line 20 in the program 'seeds' the array with the first two primes, these values being used to generate subsequent values in the series. Thus the array becomes self-generating. The variable N is the number being tested, and the variable S is the subscript of the array which is waiting to be filled. Once the array is complete, the program passes on to line 100. Here would be the main body of the program. To test a number to determine if it is prime it is only necessary to define that number as N, and then to GOSUB 5000. If the flag (FL) is returned as zero then the number is prime; if it is returned as 1 then a factor has been found. Note that in both of these listings if a factor is found and the flag is set to 1, the search ends immediately, so speeding up the test — an important consideration where there are many numbers to be tested. The reason for adding .5 to the value of SQR(N) in lines 1020 and 5010 is to overcome the slight inaccuracy which sometimes occurs with this command.

The rest of the competition program was quite straightforward, almost all competitors adopting what Robin Telkman of Sale describes as a 'top down' approach. That is, starting with the eight digit cube (cubes of numbers in the range 216 to 464) each digit is deleted in turn and only if the resulting value passes the primality test, is the value tested further. If the sequence finishes with a three-digit prime, then the test has been completed and the relevent values can be printed out.

With regard to increasing the speed of execution of the program several entrants used the speed poke, and Robin Telkman also suggests keeping the frequently used routines, near the beginning of the program (ie with low line numbers). And finally this month I'd like to mention Jonathan Harrop of Wantage, for no reason other than that he complains that we always spell his name wrong. *(Ah! You mean Jinithom Hyrrep of Womtish! Sorry, Jin. — Ed.)* Well, I hope we've got it right this time! Cheerio for now, and keep those entries coming in.

Expert's Arcade Arena

Write to 'The Expert' at Dragon User 12-13 Little Newport St, London WC2H 7PP. with all your arcade tips and hints.

GREETINGS, Comrades. Here are the maps! Firstly, a big thank you to everyone who has sent maps in — but a plea, too. The Great One pleading!! Please send in maps as clearly and as neatly as you can do them. I would advise the use of graph paper where distance is relevant, but this makes the need for bold drawings in black ink even more necessary. Avoid pencil if you can, or use a strong black pencil.

So, to the maps. Firstly, a *Brock's Kingdom* map (at last, thank you) from P. Scott, of North Yorkshire. This is a good map, clear, concise and to the point. Which leads me rather neatly into *Castle of Doom*, and another important thing about maps: if you don't put your name on them — that means on the actual map, not in a separate letter — they tend to end up separated in my office, and you won't get to see your name in lights, or, at least, in black and white. I haven't ever played *Castle of Doom* so I can't testify as to how useful this map will be. The next map, however, I drew with my own fair hands and will be very useful to people playing the arcade adventure *Tanglewood* from Microdeal. The reason the top left hand corner is left blank is so as not to spoil the surprise when you get past the gi-ants. Now, while we're on the subject of *Tanglewood*, how about maps of *Dwarf Dive* and *Castle Schark* from some of you?? Eh??

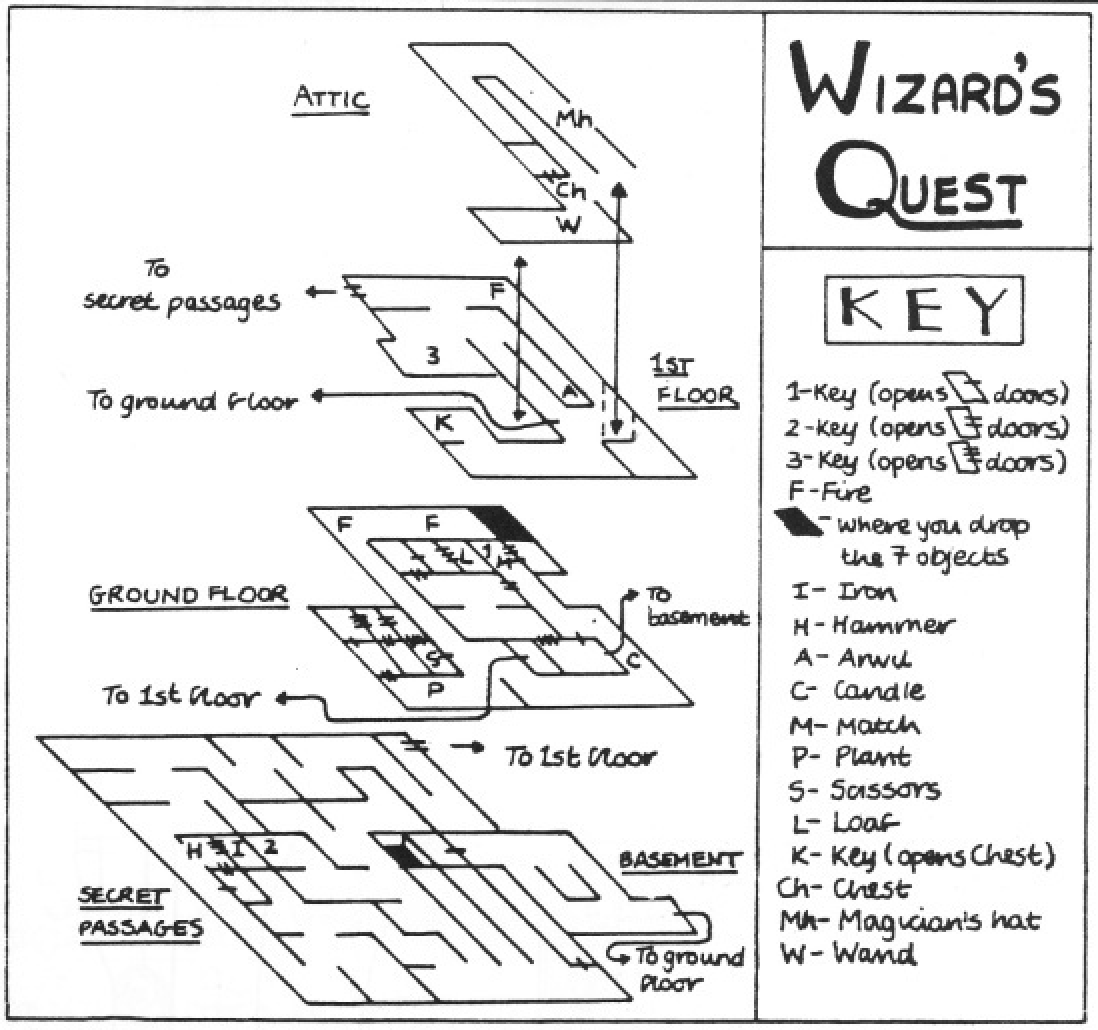
So to the *Wizard's Quest* map. This map presents a lesson in the 'It seemed like a good idea at the time' school of map making. No name on it either. Nuff said?

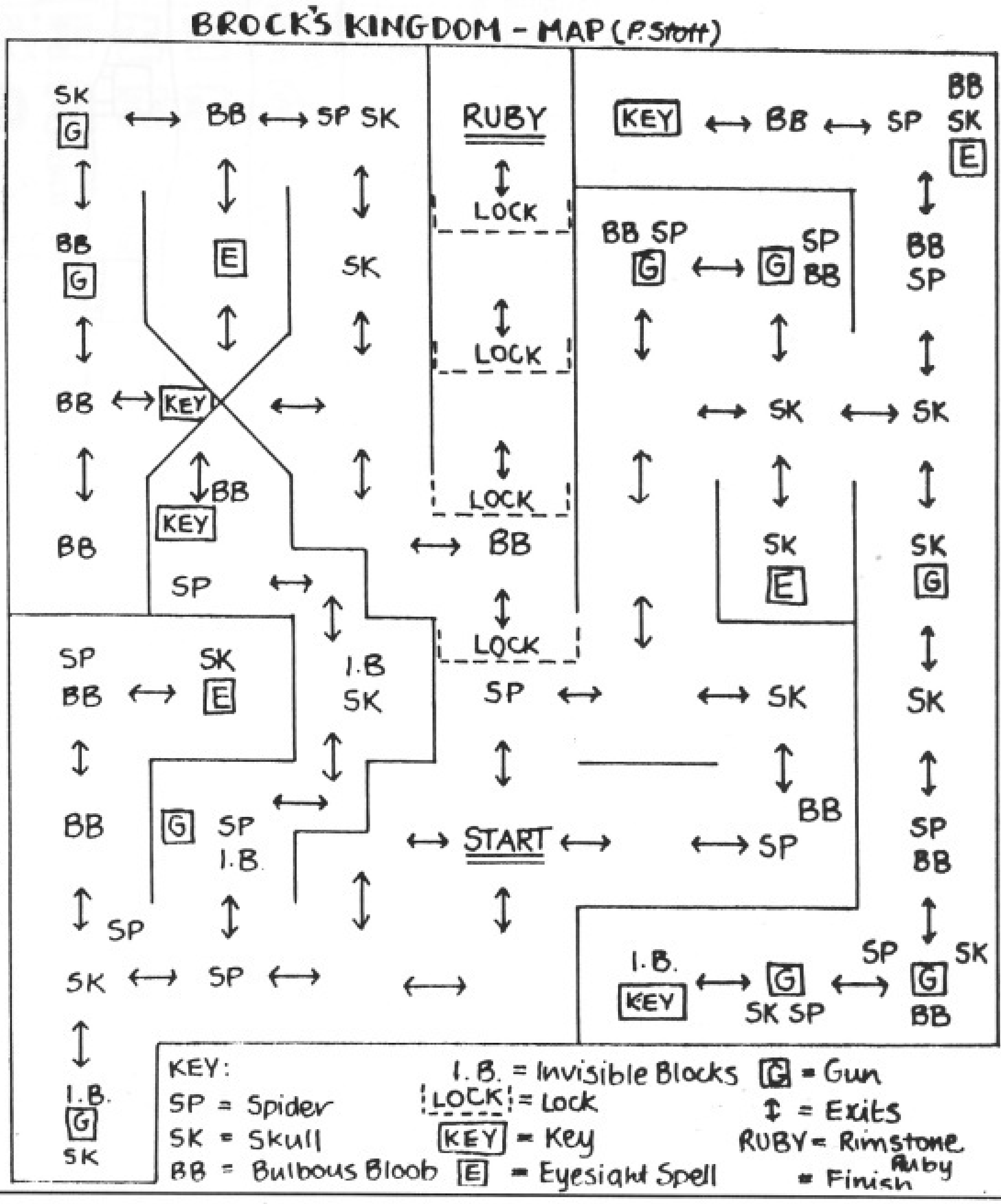
Lastly, Graham Rice's map of stages two and three of *Copta Snatch*, and don't bother sending in maps of the latter sections as I've got them and I'm going public in two months. "But... but... Why? Why not next month??" Because next month is the "Expert's Game Round Up!!" and, also, an answer at last (well, an answer of sorts) to the question "Who is the Expert?" will be answered, complete with photo and CV.

How can you wait? I know, this brings new meaning to the word 'zarjazz'. And that's something none of you understand, you greebling bunch of grexnix.

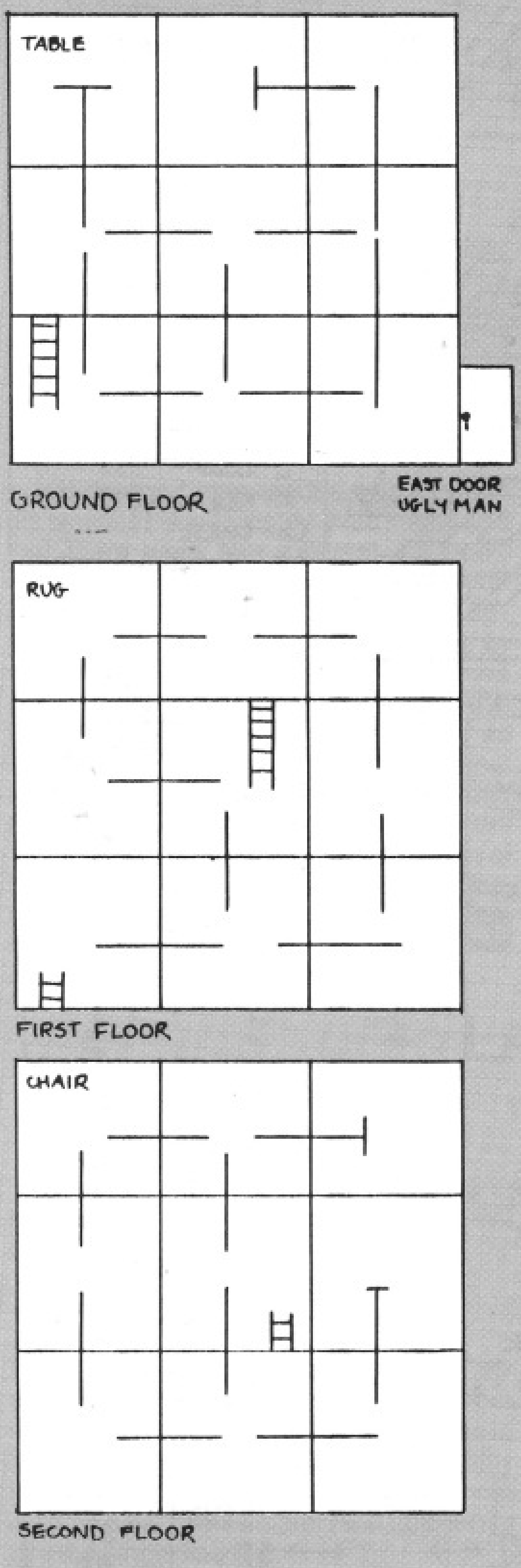
Editor's Note: We looked at the maps and decided that any attempt at re-drawing would simply further any confusion. One notable exception was the Expert's Tanglewood, *which not only avoided the Expert's advice about strong black pens, but overlooked the essential fact that, in black and white printing, red comes out black, and blue (especially that pretty turquoise blue, Exie) comes out invisible.*

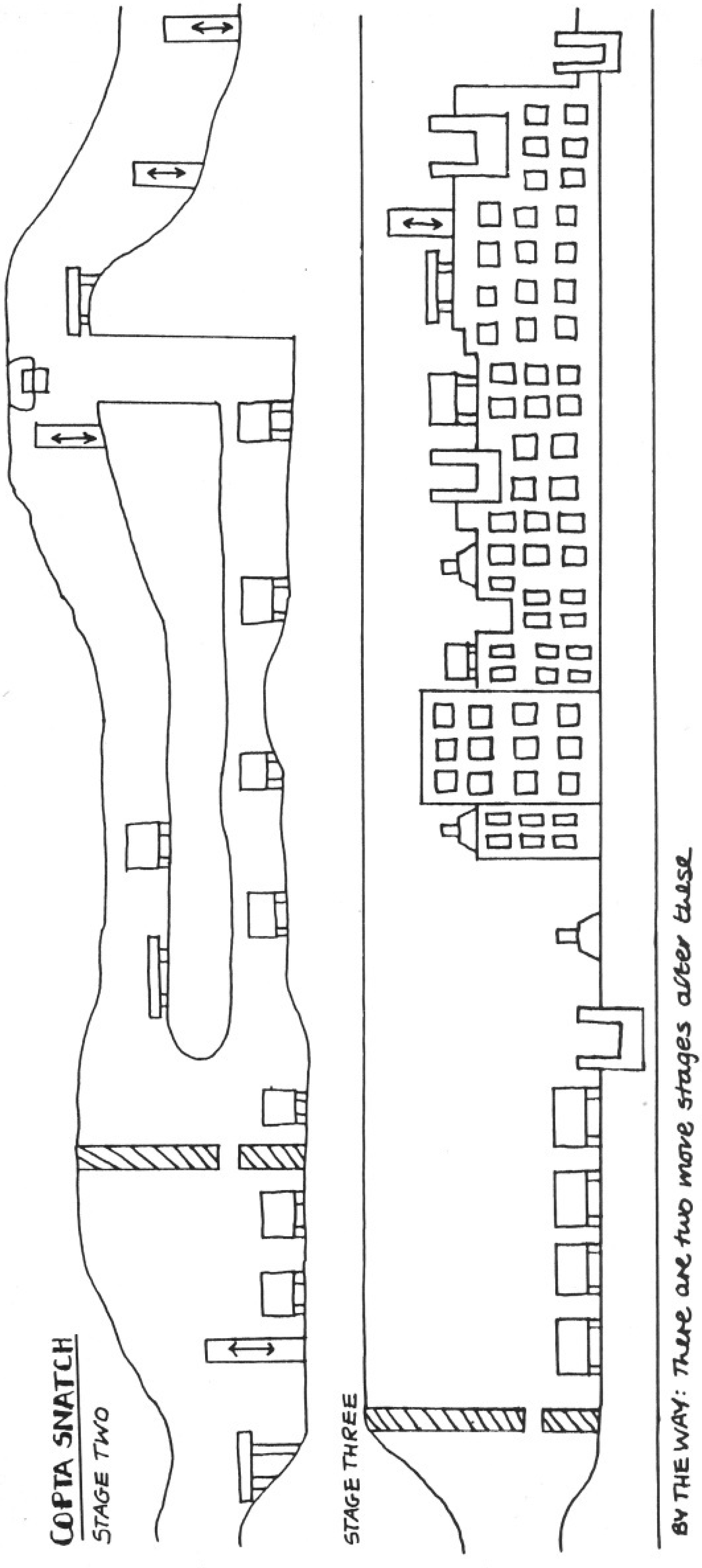
The artfully placed splash of blood in the corner of Brock's Kingdom *turned out to be outflow from the artist's leaky felt-tip. Snowpake to the rescue — again. We hope you find these guides useful.*

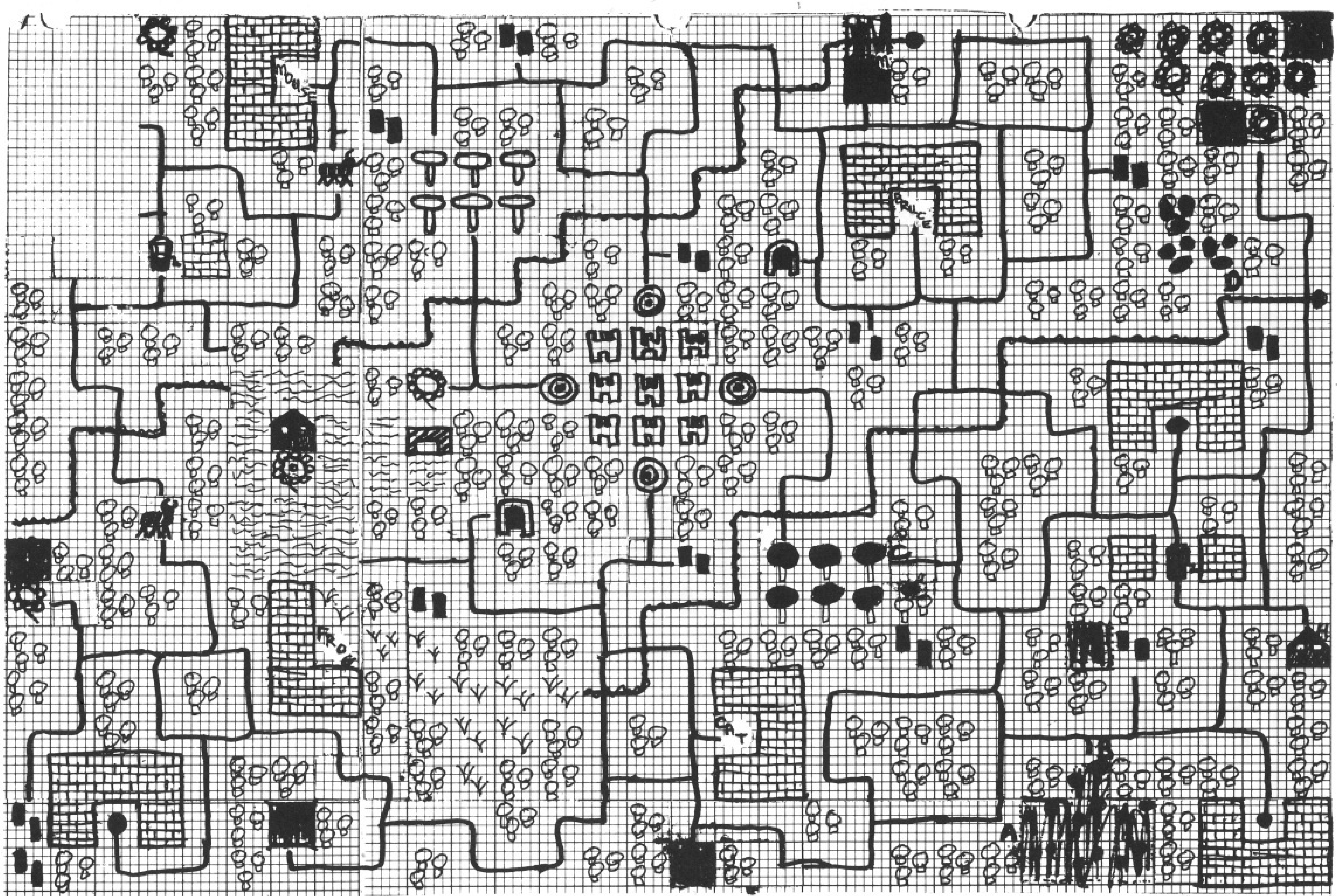




CASTLE OF DOOM







TANGLEWOOD From A: → ↓ ↑ ↓ → ↓ → ↓ ← COTTAGE From B: ↓ ↓ ↑ ↓ → ↓ → ↓ ← COTTAGE From C: ← ← ↓ → ↓ BIRD'S NEST From D: ↑ ↑ → ↓ ↓

Speech recognition

***Ziv Eliraz** teaches his Dragon to come when he calls*

THIS program will enable your Dragon to understand and identify human speech, music or any other sound you can make, based on software and your tape.

You control it using new commands which are patched onto the existing Basic. This is a great tool for the handicapped, as it requires only the human voice to control it. Hooking up is fairly easy (see figure 1), but the program won't work on every tape. You must have a tape that outputs to the speaker (ie EAR jack) whatever is inputted through the MIC (I use Dixons TR17). You can see if your tape is suitable by connecting the microphone, talking with the RADIO ON, and seeing if the TV amplifies whatever you say. Another good use for this program is passing information from computer to computer using whatever sound commands one computer has, to the Dragon without any hardware connections (you can pass graphic screens, data etc.). If you have a speech module attached to the other computer, you can even have it speak to the Dragon.

The commands added are these:

1) **WORDSET place, words:**

You must have this command at the beginning of every program, so the program will know where in the memory to put the coded words. Since every word takes 100 bytes (changeable), the actual place in the memory will be place *100+4500.

Words is the number of words you plan to include in this part of the memory. To protect this area from being overwritten by Basic, you should:

10 CLEAR whatever, place *100+4500.

Word number 0 is used by the system, so two words will take 300 bytes. ERASE0, RECEIVE0, and AVERAGE0 will result in an error.

2) **ERASE word:**

Clears the memory occupied before by a word. This should be done before first RECIEVEing or the understanding process will not work well.

3) **RECEIVE word:**

Translates sounds from the cassette to the memory. Default size is 100 bytes, which will allow about one word, depending on the sounds you say. Sounds like 's' or 'f' take a lot of space (and are thus easily identified) while 'b' or 'd' are very short (and hard to tell apart). You'll have to say 'bean' and 'dean' VERY clearly so that the Dragon can tell them apart — but then again, what was the last program you wrote using 'bean' and 'dean'?

Rarely does the word we say fit in exactly 100 bytes. If it is longer, or has many 's's, the system will return to Basic automatically. If you have finished saying your word and there is still more time, have the joystick handy and press the fire button. This will return you to Basic. (Up or Down are examples of such words). If you don't have one, say the word and a long 'sssss' afterwards.

4) **AVERAGE word:**

Since we can't always say the same work in exactly the same way, it is always good to average any word said by RECIEVE w: AVERAGE w: By doing so it's much more likely that the word said again later will be understood.

5) **MATCH:**

After all the words you have said are in the memory MATCH will ask for yet another word and then return to basic.

There are also two functions to know the word said and its quality.

1) **WORDSAID:**

Returns the number of the word that has been said (for example: MATCH:PRINT WORDSAID).

2) **PENALTY:**

PENALTY returns the high byte of the penalty points for the word you said. If PRINT PENALTY returns 0, it means you were pretty close to saying the word exactly as the first time, and it's almost certain that that was the word you said. If it returns more than 4 or 5 it means you probably said a word not RECIEVEd, and that WORDSAID is the word which sounds most like it.

Tips

Say the word as you like, but when you repeat it, you must say it in exactly the same way. The program is also sensitive to different pitches, so while it will understand you, it won't understand anyone else. This does have its advantages though — you can hum, sing or whistle your favourite tune, and have it repeated.

The program works best in total silence and best results are achieved under those circumstances (no, you can't listen to Iron Maiden's latest hit and be understood).

Divide your words into subjects. For example, have one place which will include YES and NO, then another for UP, DOWN, LEFT, RIGHT, SHOOT and use the different areas in the memory for different subjects in the program. The more words you add, so grows the chance of error. (This does not apply to sounds from an electronic musical instrument, or whistling, as these have distinctive sound envelopes).

If you have a machine code routine, take care that your words don't erase it (if it starts at 20,000, don't use WORDSET 155,5...)

Screaming at the program won't help. The Dragon is pretty sensitive here, and if you see that the program makes mistakes too many times for it to be reasonable, it probably means the source word is wrong. RECEIVE it again.

Listings

To run speech recognition you must enter the code (Listing two) with the hex loader (Listing one). After you are finished, type CSAVEM"SR.CODE", 27700,28400,27700 and the code will be saved. The code sits in locations 2770 to 28400, and the system uses another 1600 bytes, so reaching up to 30000, so DeltaDOS users will be able to use the disc drive with the program.

Listing three is a simple program that listens to what you sing/hum/play, writes it on the screen and then lets you play the tune back by saying "PLAY" and edit it with "ERASE" (the program will ask you to say these in the beginning). You will also notice that the program does not follow note lengths, this is made to ensure correct note entry. Using Listing four you can change the parameters of the program and in that way make the length of the words shorter or longer. This way the notes entered in Listing three will be much shorter, and program will follow note lengths, but the quality of recognition will fall because each note also has attack and decay values.

Listing five is a general menu driven program to demonstrate the abilities of speech recognition. It allows the user to input words, average them, see their graphs, check recognition and save them to tape.

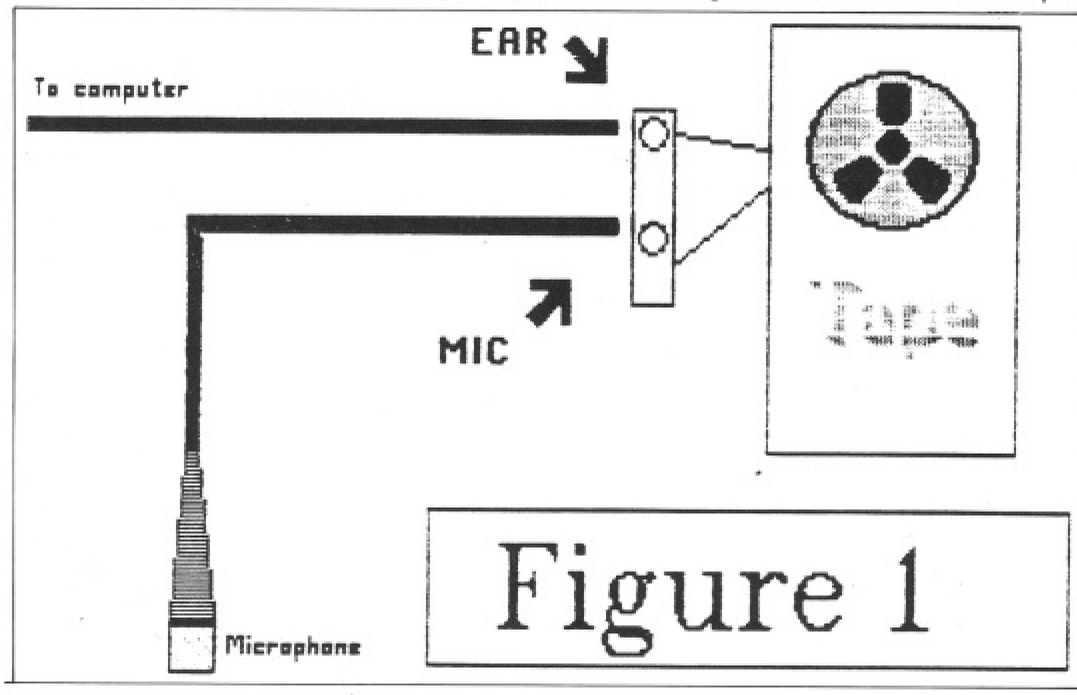


Figure 1

Listing 1

```
10 CLS:PRINT:PRINT"  CHECKSUM CHECKER":PRINT:INPUT"START";ST:INPUT"END";EN
20 FORII=ST TO EN STEP 8
30 CS=0:PRINTII;": ";:LINEINPUTA$
40 FORI=1 TO LEN(A$) STEP2
50 M$=MID$(A$,I,2):A=VAL("&H"+M$):POKEII+I/2,A:CS=CS+A:NEXTI
60 INPUT" = ";C:IF CS<>C THEN PRINT"CHECKSUM ERROR":GOTO30
70 NEXTII
```

Listing 2

```
27700 : 8E012A108E0134A6 = 562
27708 : 80A7A08C013425F7 = 932
27716 : 8605B7012A8E6E6B = 724
27724 : BF012B8E6C6FBF01 = 788
27732 : 2D8602B7012F8E6C = 662
27740 : 86BF01328E6E8ABF = 957
27748 : 0130BD8434BDBDDC = 1020
27756 : 7E837180CE2A037E = 875
27764 : 89B48E6C7C7E84ED = 1186
27772 : 6C9E6CB66CD96CF1 = 1230
27780 : 6D0AC0442A037E89 = 687
27788 : B48E6C95AD957E88 = 1163
27796 : 746DA36DA9C6077E = 997
27804 : 8344BD8E51C10027 = 843
27812 : F4F76E39BD89AABD = 1343
27820 : 8E51C10027E7F76E = 1043
27828 : 4139BD8E51C10027 = 766
27836 : DCF76E3BB66E39BB = 1172
27844 : 6E3BC6643D1F0130 = 608
27852 : 8911944F5FA7805C = 863
27860 : C16323F939BD8E51 = 1045
27868 : C10027B9F76E3F4F = 916
27876 : B76E3D1700C5F66E = 930
27884 : 3F1700EF39BD8E51 = 794
27892 : C10027A1F76E3F86 = 947
27900 : 01B76E3D1700ACF6 = 796
27908 : 6E3F1700D6394FB7 = 729
27916 : 6E3DB66E39C6643D = 879
27924 : 1F01308911944F5F = 556
27932 : A7805CC16323F917 = 986
27940 : 0089C6001700B48E = 680
27948 : FFFFBF6E654FB76E = 1284
27956 : 438601B76E474FB7 = 828
27964 : 6E498E0000BF6E4B = 701
27972 : B66E39BB6E47C664 = 1015
27980 : 3D1F0130891194B6 = 625
27988 : 6E39C6643D1F0231 = 608
27996 : A91194B66E493086 = 881
28004 : 31A6A684A1A42304 = 877
28012 : A0A42004A6A4A084 = 982
28020 : BE6E4B3086BF6E4B = 933
28028 : 7C6E49B66E498163 = 900
28036 : 23BEBE6E4BBC6E65 = 999
28044 : 2409BF6E65B66E47 = 810
28052 : B76E437C6E47B66E = 957
28060 : 47B16E41239839F6 = 913
28068 : 6E437E8C36F66E65 = 954
28076 : 7E8C361A10CEFF20 = 855
28084 : BE6E6710BE6E695F = 919
28092 : 5C8D1F64C425F9E7 = 1077
28100 : 805F5C8D1564C424 = 809
28108 : F9E780F6FF005424 = 1229
28116 : 04313E26E2BF6E4F = 759
28124 : 1CEF39FB6E398664 = 976
28132 : 3D1F0231A9119410 = 493
28140 : BF6E37BE6E67BF6E = 1060
28148 : 478600B76E49108E = 729
28156 : 0000E68031A54C81 = 777
28164 : 0F23F71F20445644 = 582
28172 : 564456121210BE6E = 592
28180 : 37200CE7A010BF6E = 807
28188 : 37BC6E4F23D339B6 = 917
28196 : 6E3D810027ED4F1F = 686
28204 : 03A6A433C61F3044 = 729
28212 : 5620E067A4DC0008 = 837
28220 : FF00FF0A000A000A = 540
28228 : FFFFFF0BF0640003 = 1119
28236 : D1FFFF70E60000FF = 1316
28244 : FFFFFF00000000FF = 1020
28252 : FFFFFF00000000FF = 1020
28260 : FF03D16EF0064057 = 974
28268 : 4F52445345D44552 = 744
28276 : 4153C55245434549 = 705
28284 : 56C5415645524147 = 721
28292 : C54D415443C8574F = 856
28300 : 5244534149C45045 = 716
28308 : 4E414C54D9FFFF00 = 1030
```

Listing 3

```
10 CLEAR500,26500 :REMARK:(220*100+4500)
20 WORDSET220,10
30 ERASE9:ERASE10
40 DIMA$(8)
50 CLS:A$=STRING$(32,"*"):PRINTA$+"MUSIC WRITER":PRINTA$:PRINT:PRINT"REPEAT THE FOLLOWING TONES..."
60 PRINT"PRESS ANY KEY..."
70 A$=INKEY$:IF A$="" THEN 70
80 PLAY"L2"
90 FORI=1 TO 8:READA$(I):PRINTRIGHT$(A$(I),1):ERASEI:PLAYA$(I):RECEIVEI:AVERAGEI:NEXTI
100 PLAY"CCC"
```

```
110 PRINT"NOW,PLEASE SAY 'ERASE'...":REC
EIVE9:PLAY"DDC":PRINT"AND THEN SAY 'PLAY
' TWICE,AFTER EACH TONE...":SOUND200,6:R
ECEIVE10:SOUND200,6:AVERAGE10
120 CLS:PRINT"TO PROGRAM THE TUNE,JUST M
AKE   THE APPROPRIATE SOUND.          TO
 DELETE AN UNWANTED NOTE,      SAY 'ERASE
'  AND TO PLAY THE      WHOLE TUNE, SAY 'P
LAY'"
130 PRINT"PRESS ANY KEY WHEN READY...":E
XEC41194
140 TU$="":PLAY"L2"
150 FORI=1 TO 3:SOUNDI*50,1:NEXT:MATCH:A
=WORDSAID:IF A<9 THEN TU$=TU$+A$(A):CLS:
PRINTTU$:GOTO150
160 IF A=9 THEN IF LEN(TU$)>2 THEN TU$=L
EFT$(TU$,LEN(TU$)-3):CLS:PRINTTU$:GOTO15
0 ELSE GOTO 150
170 PLAY"L8"+TU$+"L2":GOTO 150
180 GOTO 150
190 DATA O3C,O3D,O3E,O3F,O3G,O3A,O3B,O4C
200 MATCH:PRINTWORDSAID:PLAY"CCC":GOTO 2
00
210 REMARK: DON'T MAKE THE STRING TOO
220 REMARK: LONG- YOU MIGHT GET AN
230 REMARK: LS ERROR.
```

Listing 4

```
10 ''''''''''''''''''''''''''''''
20 ' PARAMETER CHANGER          '
30 ''''''''''''''''''''''''''''''
40 CLS:PRINT" word length changer"
50 PRINT:PRINT"THIS PROGRAM WILL ENABLE
YOU TO"
60 PRINT"CHANGE THE LENGTH OF WORDS IN "
70 PRINT"THE MEMORY. THE DEFAULT IS A "
80 PRINT"HUNDRED BYTES. DELTADOS USERS"
90 PRINT"WILL ONLY BE ABLE TO MAKE THE "
100 PRINT"WORD LENGTHS SHORTER."
110 PRINT"note: THE COMMAND WORDSET NOW"
120 PRINT"CHANGES,I.E. NOT place*100+450
0"
130 PRINT"BUT place*newlength+newstart"
140 PRINT:PRINT"PRESS ANY KEY...":EXEC41
194
150 CLS:INPUT"NEW LENGTH FOR WORD";NL:IN
PUT"NEW START";NS
160 IF NL>255 OR NS>27700 THEN PRINT"***
ERROR***":GOTO 150
170 FORI=1 TO 8:README,MI:POKEME,NL-MI:N
EXTI
180 TEMP=NL*16:GOSUB 1000:POKE &H6E69,HI
:POKE&H6E6A,LO
190 TEMP=NS:GOSUB1000:FORI=1 TO 5:README
:IF PEEK(ME)=&H11 AND PEEK(ME+1)=&H94 TH
EN POKEME,HI:POKEME+1,LO:NEXTI ELSE PRIN
T"YOU HAVE A DATA INPUT ERROR.
200 END
1000 HI=INT(TEMP/256):LO=TEMP-HI*256:RET
URN
2000 DATA 27847,0,27861,-1,27922,0,27936
,-1,27979,0,27991,0,28035,-1,28131,0
2010 DATA 27853,27928,27985,27997,28137
3000 REMARKS:
3010 IF ANY OF YOU DRAGON USERS
3020 WANT TO SEE HOW THE PROGRAM
3030 STORES THE WORDS IN THE
3040 MEMORY AND SEE IT CHANGE
3050 LIVE, TYPE THESE VALUES:
3060 NEW WORD LENGTH=20, NEW
3070 START=1024. then THOUGH
3080 BASIC TYPE:
3090 : 10 WORDSET 1,1
3100 : 20 RECEIVE1:GOTO 20
```

Listing 5

```
10 ''''''''''''''''''''''''''''''
20 '  VOICE RECOGNITION -        '
30 '                             '
40 ' DEMONSTRATION PROGRAM       '
50 '                             '
60 '  UP TO TEN WORDS CAN BE     '
70 '  INPUTED HERE,BUT THERE     '
80 ' 'IS NO ACTUAL LIMIT.        '
90 ''''''''''''''''''''''''''''''
100 CLEAR200,26500
110 S$=STRING$(32,42)
120 DIM W$(10)
130 WO=1:WORDSET 220,WO
140 CLS:PRINTS$;"      VOICE RECOGNITIO
N"
150 PRINTS$:PRINTCHR$(13)+"PRESS:":PRINT
"1> RECEIVE VOICE PRINTS":PRINT"2> MATCH
 WORDS":PRINT"3> END
160 A$=INKEY$:IF A$="" THEN 160 ELSE A=V
AL(A$)
170 IF A<1 OR A>3 THEN 160
180 IF A=3 THEN END
190 ON A GOSUB 210,370
200 GOTO140
210 CLS:PRINTS$;"  RECEIVE VOICE PRINTS"
:PRINTS$:PRINT:PRINT"1> RECEIVE A WORD":
PRINT"2> AVERAGE A WORD":PRINT"3> SEE A
GRAPH OF A WORD":PRINT"4> SEE AVAILIABLE
 WORDS":PRINT"5> RETURN TO THE MAIN MENU
"
220 A$=INKEY$:IFA$=""THEN220 ELSE A=VAL(
A$)
230 IF A<1 OR A>5 THEN220
240 IF A=5 THEN RETURN
250 ON A GOSUB 270,310,330,360
260 GOTO210
270 CLS:PRINT"RECEIVE A WORD:":INPUT"PLE
ASE INPUT WORD number(1-10)  ";W:IF W<1
OR W>10 THEN 270
280 INPUT"AND WORD name..";W$(W):IF W>WO
 THEN WO=W:WORDSET220,WO
290 CLS:PRINT"OK,NOW PRESS ANY KEY AND T
HEN   SAY ";W$(W);":":EXEC41194
300 ERASEW:RECEIVEW:RETURN
310 CLS:INPUT"WHAT IS THE WORD'S name";A
$:FORI=1 TO WO:IF A$=W$(I).THEN 320 ELSE
 NEXT:PRINT"*WORD DOES NOT EXIST*":EXEC4
1194:RETURN
320 PRINT"OK,PRESS ANY KEY AND AFTER THA
T SAY ";W$(I);":":EXEC41194:AVERAGEI:RET
URN
330 CLS:INPUT"SEE GRAPH OF WHICH WORD";A
$:FORI=1 TO WO:IF A$=W$(I) THEN 340 ELSE
 NEXT:PRINT"*THERE IS NO SUCH WORD*":EXE
C41194:RETURN
340 PMODE 4,1:SCREEN1,1:PCLS:LINE-(25,19
2),PRESET:FOR X=0 TO 99:XX=X*2+25:YY=PEE
K(220*100+4500+I*100+X)*(191/255):LINE-(
XX,192-YY),PSET:NEXTX
350 A$=INKEY$:IFA$="" THEN350 ELSE RETUR
N
360 CLS:PRINT"THESE ARE THE WORDS YOU HA
VE    ENTERED:":FORI=1 TO WO:PRINTW$(I):
NEXTI:PRINT"PRESS ANY KEY...":EXEC41194:
RETURN
370 CLS:PRINTS$;"     MATCH  WORDS ":PRI
NTS$:PRINT:PRINT"PLEASE PRESS ANY KEY AN
D THEN   SAY SOMETHING TO THE MICROPHONE
.":EXEC41194:MATCH:PRINT:PRINT"YOU SAID
";W$(WORDSAID):PRINT"(AT AROUND";PENALTY
*250;"PENALTY POINTS)"
380 PRINT"PRESS ANY KEY...":EXEC41194:RE
TURN
390 '
400 ****************************
410 * TH-TH-THAT'S ALL FOLKS!! *
420 ****************************
```



LET me start where I left off last month, more or less, by using lots of the clues kindly provided to questions he'd seen in the *Adventure Contact* section by Guido Jongbeis of Belgium. Clues have been rather lacking lately, and I know it's something you like to see, so hold on to your Dragons and here goes...

In *Return of the Ring*, if you can't breathe on the Forest Moon: EROTS LARENEG NI KSAM REHTAERB YUB. Can't find blue pass? OWT LEVEL TA POHS SSAP NI YUB. What is a tracker? In Forest Moon type: REKCART ESU. What is the use of the glass? ENON. Where is the Book of Skulls? NOOM TSEROF NO TSREOF OTNI SELIM LLERK NET. How to open chest in Halm's Temple? EINEG EHT FO YEK EHT HTIW.

In *Syzygy*, how to kill the alien: TI TA ERUTAERC YZZUF WORHT. In *Quest*, how to cross the river: TAOB A YUB. In *Mansion of Doom*, how to get across the deep pool of acid blocking path to coffin: TI PORD DNA KCAS NEPO. When you shoot the werewolf the path down disappears: (EKANS EHT) YAW REHTONA YRT.

Next, *Trekboer*. How do you use the Teleport? 'WODNIW OG' EPYT DNA NOTTUB SSERP. How do you open the access panel? TENALP A MORF DICA HTIW. How to light the dark room? NOTTUB SSERP DNA LENAP SSECCA NEPO. In *Ring of Darkness*, can't find Yello Cube: TI TOOHS — SNOEGNUD EHT LLA NI S'TI.

That's enough help from Guido for the moment, and sorry it's taken a long while to appear, Guido, but the column's just been packed with other things the last few months.

Emeralds

More help on *Trekboer* is needed by Mr S.Schofield, Room QQ1, Mary Gee Houses, 107 Ratcliffe Road, Leicester LE2 3TE. He has the common problem of being unable to cross the lava stream. First you must DICA HTIW ETARG EVLOSID and then you AVAL REVO ELBBUR SSORC. He also wants help on *Syzygy*, if there are any kind-hearted souls out there who got further with that game than I ever did. He's got the emerald but can't get past the 2nd force field or back through the 1st on the 2nd floor. WHAT NOW? As they say.

Both seeking and offering help is Donald Morrison, 72 Diriebright Road, Inverness, Scotland IV2 3GT. Help available to anyone needing it on *El Diablero* and *Calixto Island* in exchange for the usual SAE, and SAE gladly sent to anyone offering help on *Madness and the Minotaur*. Like how to get the torch, mushroom, flute, skull, urn, sceptre etc. Little things like that.

James Bonfield has been tangled up in *Tanglewood*, but has been able to untangle himself long enough to send us a map for use while travelling at night, so thanks for that, and I'll be passing it to the editor to see if we can perhaps reproduce it in a future issue. James says that to get Peabody back, which is all that he's yet managed to do, you first have to EDAPS A TEG, then you go to the garden and SREWOLF GID in order to ENOB TEG, then take that to Peabody's kennel and drop it. What James needs to know to proceed is how to get into *Schark's Castle*, how to get the money to buy the herbs and how to get Foghorn's glasses. Help to James Bonfield, 7 Water End, Wrestlingworth, Sandy, Beds SG19 2HA.

Mirror

Gareth Edwards is offering help to anyone stranded in *Juxtaposition, Time Machine, Trekboer* and *Space Trek 1*, and for anyone who's written to Gareth before he asks me to point out that his new address is 1 Holyhead Court, Hendredenny, Caerphilly, Mid Glamorgan. He would also like to hear from anyone interested in swapping adventures they've finished, and needs some help on *Aquanaut 471*, specifically what to do now he's got the pipe, memory grid, plant cutters, manual and mirror. Now you've got the mirror, Gareth, you can RETSOP OG and use the memory grid to RETUPMOC XIF and then RETUPMOC NUR.

Apologies are due to Pat Winstanley and any readers who were interested in subscribing to her *Adventure Contact* or other magazines, which I recommended in the December issue. I committed the cardinal sin of missing out the address to write to, which is 13 Hollington Way, Wigan, Lancs WN3 6LS. To repeat briefly, Pat's magazines cover adventuring generally, not the Dragon in particular, but if you're at all interested in writing your own adventures then they're packed full of essential information.

A while ago I had a long (and I do mean long) letter from Richard Boryna, 71 Oakley Drive, Wellingborough, Northants NN8 3JY, and among many other things Richard threatens violence to the programmer who came up with *The Cricklewood Incident*, where he's presently stuck in a tavern with a Member of Parliament who keeps insisting he have another gin and tonic.

Richard offers help to anyone stuck in any of the following, and he points out that any request not accompanied by s.a.e. will be studiously ignored. Quite right too! Games solved are *Syzygy, Caverns of Doom (highly recommended), Trekboer, Juxtaposition*, and *Vortex Factor*, some being finished off with a little help from his friends. He says one of the main problems in *Juxtaposition* has always been getting the Eridani emerald, and Richard's advice on this is going to be printed forwards, so anyone who doesn't want to know the solution had better read the next bit with their eyes closed. First, he says, you can forget all about it till the Deeds of Brown have been found. To get them, get the inner tube off the wheel, mend it with the sticky tape, open the valve in a power pyramid and inflate it, wear it, go to the shaft in the Brown lands that is next to the Blue Mountains, swim the river in it, examine the skeleton and use the sender unit. If you can't figure out what to do next, enter the tower with the emerald in it, grab it and use the sender.

Fear of spiders

Right, you can open your eyes again now, though better close them again quickly if you're scared of spiders, like the one found in *Trekboer*. To get rid of that using the Boryna method, you give it the capsule, wait till it goes to sleep, pick it up, carry it to the room containing the Xendos plant, drop it, grab the plant, leave the room, press the button twice and, hey presto, one spiffulated spider!

Now for some tips on *Vortex Factor* from the same prolific source, and Richard says this is a very devious adventure. As he's solved it, that can only make him a very devious adventurer. He says that the game contains numerous secret doors, so examine absolutely everything again and again, and yet again when you've done something with it. One problem is how to get a light, and the answer is that you have to make a candle. To do this, get the bird from the waxworks exhibit, go to 1200 (the blue cartridge), melt the bird over the torches to get a ball of wax and then MAKE CANDLE.

Other tips: your battery needs some acid, so how about citric acid? Diamonds are

simply lumps of coal that have been subjected to high pressures and temperatures for a number of years. Primitive locks can be picked with bits of wire. And how about plying a few people (living or otherwise) with gifts? And how about making the *Adventure Trail* at least four pages long? Oh sorry, the last one was a request, not a tip. Quite a common request, too, and while it's a nice suggestion let me say that it's not simply a matter of bunging more pages into the magazine. The size and cost of your copy of *Dragon User* are dictated by lots of considerations, not least the amount of advertising that comes in. You can't simply make the *Adventure Trail* four pages longer by adding four pages to the magazine. That bungs up the cost of production, and would increase the cover price quite considerably. Then there are all the other readers who aren't the least bit interested in adventures, and would say that if *Adventure Trail* has four more pages, why can't the arcade section be bigger too? Comprendez? But don't let that stop you asking for more space, as it's nice to know you're appreciated!

A quick word count tells me I've just passed the 1400 mark, so nearly time to close, but not before mentioning a couple of letters that are a few months old but have only just surfaced from beneath my tottering pile of jiffy bags, cassettes, magazines and other Dragon paraphernalia. Joe Brincat, 73 Annunciation Street, Hamrun, Malta is having trouble with *Total Eclipse*, which he thinks is brilliant, but each time the prophet tries to print some incoming message, his keyboard freezes. Joe's, that is, not the prophet's. Also Salvage and Invest are always 'Out for lunch'. Joe asks if anyone's had a similar problem and found a way round it by using POKEs or whatever.

Finally, James Bonfield of Sandy in Beds has sent me a step-by-step solution to *Syzygy* (though not a blow-by-blow guide through the action sequences, of course), and I've decided to add this to my list of free solution sheets. Well, almost free. Just for the cost of SAE. A bargain.

Adventure Contact

To help puzzled adventurers further, we are instituting an Adventure Helpline — simply fill in the coupon below, stating the name of the adventure, your problem and your name and address, and send it to Dragon User Adventure Helpline, 12/13 Little Newport Street, London WC2H 7PP. As soon as enough entries have arrived, we will start printing them in the magazine.

Don't worry — you'll still have Adventure Trial to write to as well!

Adventure . . . .

Problem . . . .

. . . .

Name . . . .

Address . . . .

. . . .

Communication

Problem: Has anyone a routine for a Pattern Generator to set up a colour TV? Using the full screen if possible. My efforts are in vain!
Name: Stan Mitchelmore.
Address: 177 Victoria Road, Dartmouth, Devon TQ6 9EG.

Problem: Dumping hires screen to my Brother HR5 printer using a machine code routine — I don't know how to do it. Help.
Name: Chris Waterhouse
Address: 23 Willow Crescent, Pinetown 3610, Natal, South Africa.

Problem: Can anyone help with a screen dump to dump graphics to a Tandy printer (not a four colour plotter), preferably a DragonDOS based program.
Name: K. Smith
Address: 249 Humber Doucy Lane, Ipswich, IPH 3PE.

Problem: Does anybody want to swap games/tips? I have 35 original titles. Send an SAE for details.
Name: R. Hamilton
Address: 31 Hocombe Road, Chandlers Ford, Hants SO5 1SN.

Problem: I want to make contact with anyone using a Dragon for medical or nursing applications or study, to help me make more use of my Dragon with opthalmic diploma studies.
Name: Philip Beed
Address: 27 Findon Road, Gosport, Hants PO12 4EP.

Problem: I am using a J. Morrison 'Speakeasy' allotone voice recognition box to control his Dragon. Unfortunately I cannot get the box to reproduce numbers, or punctuation like commas. Can anyone suggest a program or other solution?
Name: Mr. L. J. Pettman
Address: Flat 2, No. 5 Guest Grove, Newton, B19 2XB.

Write down your problem on the coupon below (make it as brief and legible as possible) together with your name and address and send it to Communication, Dragon User, 12/13 Little Newport Street, London WC2H 7PP.

Problem . . . .

. . . .

. . . .

Name . . . .

Address . . . .

. . . .

CLASSIFIED ADS

This is Gordon Lee's own solution to the November competition see page 30 for results

The Answer

AS THE November competition required a result obtained by means of 'simulating' the game being played, the actual result will vary. An answer in the range of 156 to 184 games won per thousand played is very near the mark.

The program plays the game in the same way as it would be played with actual dice:

Lines 40 to 70 throw the six dice to start each game.

Lines 90 to 110 count how many of each value have been thrown.

Lines 120 to 150 check this result to find the best score.

Lines 190 to 340 throw the dice (or selected dice) up to a further five times. At each throw a similar procedure is undertaken to count the best score, re-throw those dice which do not equal this score, and then re-assess the position after each throw.

In the event of two equal possibilities, the first score found (the lowest) is taken as the value to be aimed for.

After each game the score to date is printed out, and the complete game replayed.

```
10 REM Set up arrays & vars.
20 DIM DICE(6),SC(6)
30 GAME=0:WIN=0:LOSE=0
40 REM First throw
50 FOR F=1 TO 6
60 DICE(F)=RND(6)
70 NEXT F
80 PRINT
90 REM Count how many of each value thrown
100 FOR F=1 TO 6:SC(F)=0:NEXT
110 FOR F=1 TO 6:J=DICE(F):SC(J)=SC(J)+1:NEXT F
120 REM Find best score
130 H=0:C=0:FOR F=1 TO 6
140 IF SC(F)>H THEN H=SC(F):C=F
150 NEXT F
160 REM Check for win
170 IF H=6 THEN 350
180 REM Next 5 throws
190 FOR THROW=1 TO 5
200 REM Rethrow any 'different' dice
210 FOR F=1 TO 6
220 IF DICE(F)<>C THEN DICE(F)=RND(6)
230 NEXT
240 REM Count how many of each value thrown
250 FOR F=1 TO 6:SC(F)=0:NEXT
260 FOR F=1 TO 6:J=DICE(F):SC(J)=SC(J)+1:NEXT F
270 REM Find best score (re_assess 'H')
280 H=0:C=0:FOR F=1 TO 6
290 IF SC(F)>H THEN H=SC(F):C=F
300 NEXT F
310 REM Check for win
320 IF H=6 THEN THROW=5
330 REM Throw again
340 NEXT THROW
350 REM Increment values
360 IF H=6 THEN WIN=WIN+1 ELSE LOSE=LOSE+1
370 GAME=GAME+1
380 PRINT GAME,WIN,LOSE
390 REM Replay game
400 GOTO 40
```

Going straight

***Gordon Lee** has a word for everything — but not for his prime objective*

RECREATIONAL mathematics, like computing, has its own vocabulary of terms, the understanding of which is essential when discussing some of the topics which appear on these pages. To have to explain each term each time that it is used would be rather a tedious and lengthy process, so beginning this month is a glossary of some of the more commonly used terms. This should form a useful reference in conjunction with future competitions.

Aliquot divisors. The aliquot divisors of a number are its whole number divisors including 1 but excluding the number itself. For example, the aliquot divisors of 12 are 1, 2, 3, 4 and 6.

Alphametics. A particular type of *cryptarithm (qv)* in which the letters which are substituted for digits form words or phrases. Probably the most well known is SEND + MORE = MONEY (9567 + 1085 = 10652). The term alphametic was first coined in 1955 by the puzzlist J. A. H. Hunter.

Amicable numbers. A pair of integers, the sum of the aliquot divisors of each being equal to the other. The smallest pair is 220 and 284. Amicable triplets and larger chains also exist.

Automorphic numbers. An integer that is not prime (*q.v.*). Every composite number can be reduced to a unique set of prime factors.

Cryptarithms. Puzzles in which letters or symbols are substituted for the digits in an arithmetical expression. Ideally, a cryptarithm should have a unique solution. In a cryptarithm, identical letters represent the same digit throughout, and 'leading zeros', ie numbers having a zero at the left hand end, are not allowed. Unless otherwise stated, these puzzles are in the denary system. Alphametics (*qv*) are a particular type of cryptarithm.

Cube. (See Hexahedron).

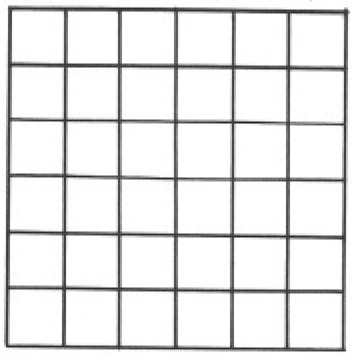
Cyclic numbers. An integer of *n* digits, which when multiplied by a value from 1 to *n* will contain the same digits as the original number in the same cyclic order. The smallest cyclic number is 142,857. For example, 142,857 x 5 = 714,285. All cyclic numbers are the periods of recurring decimals of the reciprocals of some prime numbers. The example given is that of the prime 7. The next largest prime that produces a cyclic number is 17.

Denary. Numerical notation to base 10. This is our familiar method of expressing numbers using the ten digits, zero to nine, a system also known as 'base 10'.

Digit. One of the individual symbols used to express quantities. THe number 159 is written with the digits 1, 5 and 9.

Digital root. The digital root (or DR) of a number is obtained by adding together the digits of that number until a single digit remains. For example, the DR of 1273469 is 1+2+7+3+4+6+9 = 32 = 3+2 = 5. Digital roots can provide useful negative checks. For instance, all perfect squares have DRs of either 1, 4, 7 or 9, so we would know that the number quoted above could not be a perfect square, without having to work it out. Probably the best known property of digital roots is as a test for divisibility by either 3 or 9. If the DR of a number is divisible by 3 (or 9) then the number itself is also exactly divisible.

To be continued next month.



THE competition this month is to fill in the grid shown with digits so that it contains as many prime numbers as possible. This is similar to the familiar 'word search' puzzles found in magazines, except that here we are dealing with numbers and not words.

The numbers can read in any direction — up, down, left to right, right to left, or diagonally but of course only in a straight line. The turning of corners is not permitted. For example, the sequence 6719 would contain the primes 67, 71, 19, 719 and 6719 in one direction and the prime 17 in reverse, as well as the single digit primes 1 and 2 ('1' is allowed as a prime here).

However, when counting your total score each prime can only be counted once, even though it may appear in the grid several times.

Regular readers may recall a similar competition of a couple of years ago. In that competition several of the spaces on the grid already had digits in place. Here you have a completely free hand.

To enter the competition copy your completed grid onto a sheet of paper, and then list clearly all the different primes that the grid contains.

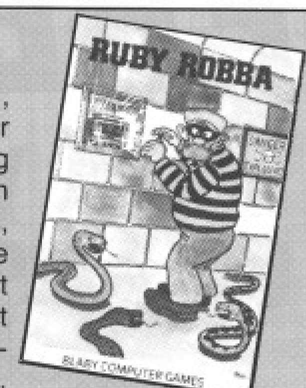
At the top of the page state the number of primes that you are claiming.

Please check your results carefully as any incorrect entries will be automatically disqualified.

Reference to Winners and Losers this month may be useful.

The winners will be the entrants with the highest scores.

Prize



AS WE have heard, Blaby Computer Games are bowing out of new Dragon software launches, unable to meet the high development costs any longer. But they are not dropping out of the market, oh no, and will go on supplying games from their back catalogue to anyone who asks. This month we have 20 copies of Orbaum favourite *Ruby Robba* for the brilliant among you.

Rules

Read Gordon's golden prose with exemplary care and attention, sit and think for around 48 hours, dash off a swift program on your Dragon to unravel the solution in an instant, print out the program and any notes you want to include, and send it post haste through the winter snow to our door. No cassettes this time, thank you, we have enough.

Right, and for our tie breaker this month, complete the motto: '1987 will be the year of the Dragon because...'. Come on, shout it out, someone might hear us.

November winners

The winners of Microdeal's popular *Wizard's Quest* in the November competition are: Peter Faraday of Warrington, Rolf Michelson of Steinkjer, C. J. Gray of Middlesbrough, F. J. Taylor of Middlesbrough (you two should do a double act), J. Boddy of Mill Hill, A. Grantham of Ipswich, P. Morgan of Bristol, Phil Sapiro of Liverpool, H. Grandy of Sheffield, S. A. Siddiqui of Chiswick, G. R. Barber of Sutton Coldfield, D. Davies of Bristol, R. E. Jones of Colchester, M. Corney of Plymouth, Clive Jones of LLanelli, E. A. Newman of Addlestone, A. R. Henderson of Bromsgrove, J. Webster of Barnsley, Brian Homes of Birmingham and T. Fawcett of Hendon.

I won't be abusing about the Dragon's power of poetry again — there were some fairly improbable tiebreakers from winners and losers alike. Favourite is:

A hacker who knows Microdeal
While travelling East took a meal
Though he liked sweetened dates
Pickled snake he did hate,
But his favoûrite was micro'd eel

— and a special mention to E. A. Newman for his incomprehensible boogie lyric.

Solution

See page **29**

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